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ABSTRACT

Human intermediation is the central issue for information professionals who have been striving to provide better services in ever-changing environments. This document reports on an empirical study of human intermediation to explore patterns of relationships between user situations and tasks they request of intermediaries using the AskERIC Q&A Service--an Internet-based digital reference service--as an instantiation of human intermediation. The book consists of 10 chapters. An Introduction presents an overview of the nature of the problems addressed, research questions, and the structure of the book. Chapter 2, "What Do We Know about User Behavior in Human Intermediation," presents an extensive review of literature that overviews the topic of this research. Chapter 3, "Search for the Optimal Approach," reviews the general research approaches in conventional information retrieval (IR) and information problem solving (IPS) research. Chapter 4, "Methodology of the Empirical Study," describes the research design and procedure applied in this study. Chapters 5 through 9, "Tasks Requested of Human Intermediaries," "Situational Factors Association with the Use of Human Intermediation," "Reasons for Using the AskERIC Q&A Service," "Evaluation of AskERIC Q&A Service," and "Patterns of Associations between Situational Factors and Tasks Requested of AskERIC Q&A Service," present major findings of this study with some implications for existing models of IR and IPS research. Chapter 5 provides the taxonomy of tasks requested of human intermediaries developed in this research. Chapter 6 reports a finding of key situational factors identified by the study as associated with the use of human intermediation and Chapter 7 presents findings on reasons for using human intermediation. Chapter 8 reports findings concerning users' evaluation of the outcome of human intermediation.

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Chapter 9 reports findings on associations between situational factors and tasks requested of human intermediaries. Chapter 10 discusses the implications of study findings for practices of information services and system design. Four appendices include forms and additional information on findings. (Contains 209 references.) (AEF)

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Use of Human Intermediation in Information Problem Solving

A User's Perspective

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by Makiko Miwa

ERIC Clearinghouse on Information & Technology

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Makiko Miwa

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Makiko Miwa is an information consultant of Epoch Research Corporation, a Tokyo-based consulting firm in the field of information services in Japan, which she started as an information broker in 1983. Her work focuses on user-based research and development of information retrieval systems and services, international information transfer, and human information behavior. She also serves on national and industrial IT related committees in Japan.

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Preface

The phenomenon of human intermediation is ubiquitous in our everyday life. Hence, people often rely on other human beings in solving their information problems. Nevertheless, we do not have much theoretical knowledge about why and in what situations people ask for information of other human beings.

Human intermediation is the central issue for information processionals who have been striving to provide better services in ever-changing environments. However, existing models and findings in library and information service (LIS) provide little understanding of what tasks people requests of human intermediaries or why and in what situations people use human intermediation. Perhaps this is because existing research had captured human intermediation mainly from the information professionals' rather than users' perspective, and therefore only partially the information problem solving (IPS) tasks users intend to request of human intermediaries, merely in the context of using a service or source without fully taking into consideration social and environmental situations related users' IPS processes.

As a professional intermediary who has worked for a long time in a variety of settings, I noticed there exists some patterns of relationships between user situations and what they request of intermediaries. However, literature in library and information science (LIS) do not provide adequate level of theoretical explanations to suggest the existence of such relationships, even though it provides a large number of weak theories and contradictory findings on human intermediation.

Perhaps there may be shared patterns of user situations and information behavior. If such patterns exist and if we could capture them in a model as information behavioral grammar, we might be able to attain a better understanding of human intermediation in relation to users' IPS processes, which may provide bases for a better design of information systems and services. This idea led me to undertake an empirical study of human intermediation to explore patterns of relationships between user situations and tasks they request of intermediaries using the AskERIC Q&A Service – an Internet-based digital reference service (DRS) – as an instantiation of human intermediation (Miwa, 2000).

The study's findings imply that the goal model of Bandura's (1986) social cognitive theory may adequately explain users' IPS processes. Users' IPS processes are likely to be guided by their IPS goals (cognitively generated images of preferable future events) that define current information needs or goals of using human intermediation (standards of the outcome of current action). The findings suggest the existence of patterns of relationships between IPS goals and tasks users requests of human intermediaries as well as with five situational factors including (1) type of information users sought, (2) how user goals are generated, (3) users capacity in IPS, (4) evaluation score and (5) evaluation criteria.

Patterns of relationships were also identified between goals of using human intermediation and tasks users requests and three situational variables of (1) whether users did self-searching before making requests, (2) whether users had experience in using the human intermediation, and (3) perceived level of users' IPS skill. Accordingly, the research identified several key situational variables of users and generated a conceptual model that captures relationships among them.

While a final conclusion regarding relationships between variables awaits future research, the study helps to generate hypotheses to be tested in future research. The conceptual model offers an improved understanding of systematic relationships between user goals and tasks they request of intermediaries as well as key situational variables within people's opportunistic information behavior. This improved understanding is expected to provide researchers with potentially important situational variables to be incorporated into future research, while offering practitioners guides toward better information services and system design. In addition to these findings and the conceptual model, the study developed two taxonomies potentially useful for future research and practice. "Taxonomy of Tasks Requested of Intermediaries" (Table 5-1) has potential for identifying and categorizing tasks requested of intermediaries for purposes of both research and practice. The taxonomy may help understand width and depth of users' intentions in using human intermediation and define boundaries of information services. "User-Based Evaluation Criteria of the AskERIC Q&A Service" (Table 8-12) has potential for future research in identifying associations between user goals and user value systems in a variety of settings. This taxonomy might have potential for evaluating current practices of information services in a variety of environments.

Based on this premise, I wrote this book to share the study's findings with a wide range of researchers interested in human information behavior, and practitioners involved in information services and system design.

There were a number of people associated in various ways with the advent of this book. I wish to acknowledge the help of the AskERIC Q&A Service and the Information Institute of Syracuse who provided necessary resource for the execution of the research project. I am especially indebted to Dave Lankes and Pauline Lynch for their collaboration on the research project. I give special thanks to my doctoral advisor Barbara Kwasnik who guided me from the beginning of the dissertation research toward the successful completion. I with to

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All of these people and many more have influenced the development of this book. The form and content, however, remains my own. As a person who does not write well in English, I wish to acknowledge with thanks to the text editing ability of Sue Wurster. A final note of thanks to my best friend and husband Katsuhiko Ichinowatari: This book would not have been possible without his support and patience.

Makiko Miwa
Tokyo, Japan
September 2000

CHAPTER ONE

INTRODUCTION

People sometimes rely on other human beings in solving their information problems. This book is based on an empirical study that inquired as to why and in what situations users made requests of human intermediaries in solving their information problems (Miwa, 2000). The study made distinctions among different kinds of information problem solving (IPS) tasks requested of human intermediaries. Accordingly, this research sought to find patterns between users' situations and the IPS tasks they requested of human intermediaries using the AskERIC Q&A Service – an Internet-based digital reference service (DRS) – as an instantiation of human intermediation. The study assumed the use of human intermediation as a particular activity encompassed within users' IPS processes, and explored these processes from the users' rather than intermediaries' perspective.

This chapter presents an overview of the nature of the problems addressed, research questions, and the structure of following chapters.

WHY STUDY HUMAN INTERMEDIATION?

During the 1970s' when commercial online bibliographic information retrieval (IR) systems were first introduced to the public, they were mainly accessed by librarians and other professional intermediaries who performed searches, as part of their job, on behalf of end-users. Due to the difficulty of learning the search skills required to manipulate these IR systems, the commercial online bibliographic IR systems of the time inherently limited end-users' direct searching and necessitated mediation by trained professional intermediaries (Eisenberg, 1983; Hawkins, 1981; Mischo & Lee, 1987).

The current widespread availability of so-called user-oriented IR systems, such as Internet search engines, online public access catalogs (OPACs), and CD-ROM databases, has enabled users to directly manipulate IR systems with minimal cost. In addition, an increased availability of full-text, numeric, and visual databases from a variety of media, including consumer online services and the Internet, has provided users with enhanced access to a variety of electronically stored information through the use of IR systems.

As a result, more users than ever before now have opportunities for directly searching electronically stored information using IR systems providing they live in an environment where direct access to a variety of IR systems is available. In fact, the literature reports on the proliferation of end-user direct searching of IR systems in academic and medical libraries while the role of professional intermediaries has shifted from providers of mediated searching to trainers and assistants of end-user direct-searching (Mischo & Lee, 1987; Dalrymple & Roderer, 1994). Reflecting such trends, the focus of research in information retrieval (IR) seems to have shifted from human intermediation toward direct-searching by end-users.

The question might be raised: Since end-user direct searching is rising, why study human intermediation now, when it may be a declining phenomenon? Empirical evidence suggests that the proliferation of end-user direct searching does not necessarily mean all users are inclined to perform direct searching. First, there are a number of users, typically among non-academic practitioners, such as managers, journalists and politicians, who still rely heavily on professional intermediaries in their use of IR systems. They are expected to do so at least for the near future, even though they have been provided with direct access to IR systems (Nicholas, 1995). Second, a great deal of literature on end-user training in using IR systems has reported the emergence among end-users of non-professional intermediaries who undertake information-seeking tasks on behalf of other end-users (Nicholas 1995; Salovaara, 1988; Arnold, 1987; Mischo & Lee, 1987; Cole & Bawden, 1996). Third, human-mediated digital reference services (DRSs) in the Internet environments have been proliferating – the number of these services has been growing and their client basis has been expanding (Lankes, 1998; Wasik, 1998). Thus, even though search requests of professional intermediaries might have been decreasing in traditional libraries, some users are still relying on a variety of human intermediation in their IPS processes.

The goal of user-oriented IR and IPS research is to obtain deeper understanding of the information-seeking behavior of users so as to reflect it in the design of future information services and systems (Allen, 1996; Spink & Saracevic, 1997). Thus, if some users still are relying on human intermediaries, researchers should examine in what situations and why users make requests of human intermediaries. Through such efforts, researchers should be able to obtain further understanding of human IPS processes, and to find out limitations of existing IR systems and services. Based on the findings of such empirical research, researchers may be able to develop theories and implications on which to base better information services, future education and training of information professionals, and improved IR system design. These were the major reasons supported the need for this research.

RESEARCH IN HUMAN INTERMEDIATION

Research in user information behavior concerning human intermediation is immense in volume but limited in scope. First, empirical research concerning traditional reference or online search services has focused mainly on the service providers' point of view, while little attention has been paid to the user's perspective (Spink, 1993; Spink & Saracevic, 1997). Second, IPS tasks requested of or performed by human intermediaries have

not yet been empirically examined. Even though some IPS task models have been developed for users' self-searching processes (Kuhlthau, 1992; Eisenberg & Berkowitz, 1995; Marchionini, 1995), they have not yet been applied to categorize IPS tasks requested of human intermediaries. Hence, existing studies consider human intermediation as a whole without making distinctions among different kinds of tasks requested by users of intermediaries. Third, traditional research in information science has yet to capture the use of human intermediation as a part of the user's IPS process. Instead, human intermediation has been studied as merely the use of a source of information without taking into consideration a full spectrum of users' IPS processes. Consequently, the possible association between the use of human intermediation and users' antecedent and subsequent information-seeking behavior has not yet been fully explored. Fourth, IPS and IR research have yet to capture the full spectrum of users' situational factors possibly associated with their use of human intermediation. Researchers who take cognitive and/or constructive perspectives have tried to capture users' dynamically changing situations during their IPS processes (Kuhlthau, 1992). However, most of these researchers tend to concentrate on internal states (e.g., cognitive and/or affective) rather than external situations (e.g., social and/or environmental). Fifth, user behavior with respect to Internet-based human-mediated DRSs has not yet been well studied.

These limitations suggested that this study should be designed as an exploratory investigation of the phenomenon of human intermediation as seen from a users' perspective.

CONTEXT OF THE STUDY

Contrary to existing research, this study took users' perspective, made distinctions among different tasks requested of the human intermediaries, and tried to explore users' IPS processes as part of the users' situations. This study also sought patterns of associations between users' dynamically changing situations and the tasks they requested of the human intermediaries. The study recruited clients of the AskERIC Q&A Service to explore the phenomenon.

USERS' PERSPECTIVE

Even though a great deal of literature has reported on help provided in end-user direct-searching of IR systems and tasks performed by professional intermediaries, findings were mostly based on the perspective of information professionals. Many researchers have investigated mediated search processes at a library reference service (Ingwersen, 1982) or when using online IR systems (Fenichel, 1981; Fidel, 1991; Saracevic, et al., 1988; McKibbon, et al., 1990) in order to capture patterns of search behavior of intermediaries but not of users. Some researchers analyzed interactive conversation between users and intermediaries in pre-search interviews performed as part of mediated use of IR systems. But the purposes were to develop a user model elicited from the intermediaries' cognitive processes (Daniels, 1987) or to understand how intermediaries use information elicited from users in subsequent IR sessions performed by intermediaries (Saracevic, et al., 1991; Spink & Saracevic, 1997). Some researchers studied users' IPS behavior in relation to their direct-searching of

particular IR systems (Richardson, 1981; Nicholas, 1995; Cole & Bawden, 1996) and, as by-products of their research, reported findings on user situations that led to their use of human intermediation. However, none of them asked why and in what situations users seek human intermediation.

By directly asking users, this study explicitly accounted for the reasons and situations that lead users to use human intermediation.

TAXONOMY OF TASKS REQUESTED OF INTERMEDIARIES

Research in the use of IR systems tends to assume that searches are done entirely by users or not at all (Tague-Sutcliffe, 1992), but do not make distinctions among different tasks requested of human intermediaries. Some professional literature in library and information science (LIS), however, has provided anecdotal evidence that users tend to seek help of librarians in (1) search strategy formulation, (2) use of Boolean operators, (3) use of search commands and (4) solutions of technical problems. Fidel and Soergel (1983) identified five different tasks performed by human intermediaries in mediated/delegated searching of IR systems. They are: (1) query formulation, (2) selection of IR systems and databases, (3) interaction with IR systems and databases, (4) termination of the search, and (5) post-logoff activities.

Researchers of children's information-seeking behavior in using libraries and IR systems have identified several stages in their IPS processes. Based on the findings, several researchers proposed step-wise models of IPS processes. They include the six-stage model of the *information search process (ISP model)* (Kuhlthau, 1992), the *Big Six Model of Information Problem Solving (Big 6 Model)* (Eisenberg & Berkowitz, 1995), and five information-seeking tasks of end-user searching (Marchionini, 1992).

If such distinctive stages were commonly observed in IPS processes of users, it might be reasonable to assume that tasks requested by users of human intermediaries may correspond to some or all of these stages. Thus, taxonomy of tasks requested of intermediaries might be developed based on the IPS process models. This study intended to uncover what users requested intermediaries to do, rather than what professional intermediaries were actually doing, in human intermediation, in order to concentrate on the perspective of users. Thus, this study categorized IPS tasks requested by users of human intermediaries using as a starting point the *Big 6 Model* (Appendix B1 (1)), because it was acknowledged to be more flexible than others in capturing IPS processes of a variety of people in different settings (Eisenberg & Lowe, 1997).

OBSERVATION OF USERS' IPS PROCESSES THROUGH THE LENS OF HUMAN INTERMEDIATION

This research assumed that the use of human intermediation was a particular activity encompassed within users' IPS processes. Accordingly, the research tried to capture IPS processes of users' antecedent and subsequent activities as part of their dynamic situations. Researchers who take user-centered perspectives have

been trying to capture IPS as a process. Recently, some researchers have proposed models that posit the IR interaction as a part of a higher-level IPS process (Hert, 1995; Kuhlthau, 1992). This study followed these researchers' process-oriented view of human information behavior.

FACTORS ASSOCIATED WITH THE USE OF HUMAN INTERMEDIATION

Most of the empirical research of IR and IPS has been conducted within a single academic environment using a homogeneous population such as students. In these studies, factors found to be associated with users' IPS and IR behavior were limited to internal factors of users' knowledge, thoughts and feelings (Kuhlthau, 1992; Allen, 1996).

On the other hand, research on IPS behavior that discovered the operation of social and/or environmental factors has tended to deal with human intermediation as a source. For example, Hall (1977) proposed that different functions performed by users (e.g., research, planning, information operation) are directly associated with their parameters of value of information (e.g., specificity, depth vs. breadth, timeliness, etc.), and that these parameters determine users' preference of information sources such as access tools, human-mediated information search services, and information analysis services. Reflecting this view, the study explicitly addressed functions and/or roles of users as one of the social situational factors.

The literature in decision making has suggested that managers tend to act on problems only when three basic conditions are met. They are (1) recognition of the existence of a problem; (2) availability of resources (e.g., authority, information, expertise, money, etc.); and (3) external pressure (e.g., deadline, crisis, pressure from the boss, etc.) (McCall & Kaplan, 1990). If this theory was applicable to people other than managers, social situations might play an important role in users' decisions and/or actions in IPS processes, including their use of human intermediation.

In this study, participants were recruited from a sample of users who fulfilled the first two conditions: they had recognized the existence of a problem (i.e., information need); and they had access to potential resources (i.e., the Internet and human intermediaries). Thus, it was important for this research to account for external as well as internal situational factors that might have been associated with their use of human intermediation.

Based on the above, this study intended to capture the manifestation of external (social and environmental) factors in addition to internal (cognitive and affective) factors. Thus, preliminary factors presumably associated with the use of human intermediation were categorized into four dimensions using two axes of internal (cognitive/affective) vs. external (social/environmental) aspects and of dynamic (situational) vs. static aspects, as presented in Table 1-1. These two axes were generated based on general theories of human behavior. The axis of internal vs. social/environmental aspects was based on Bandura's (1986) social cognitive theory that proposed the triadic reciprocity of internal factors, external factors and behavior. The axis of situational

(dynamic) vs. static aspects was based on Suchman's (1987) advocacy of situated action as the basis of purposeful human communication behavior.

Table 1-1: Dimensions of Factors Associated with Users' Selection of Human Intermediation

Axis Derived from Social Cognitive Theory (Bandura, 1986) / Axis Derived from Situated Action (Suchman, 1987)	**Internal (Cognitive/Affective) Factors**	**External (Social/Environmental) Factors**
Situational (dynamic) Factors*	***Cognitive/Affective Situational Factors****	***Social/Environmental Situational Factors****
Static Factors	Internal Static Factors	Social/Environmental Static Factors

** Dimensions explicitly sought in the research are in bold*

The resulting four dimensions of factors are: (1) internal situational factors; (2) external situational factors; (3) internal static factors; and (4) external static factors. The categorization of factors into these four dimensions is relative and not at all absolute. The potential factors presumably associated with the use of human intermediation have been identified through an extensive review of the literature as presented in Chapter 2.

By categorizing tasks requested by users of human intermediaries and situational factors presumably associated with users' request of human intermediaries, this research explored patterns between users' situational factors and tasks they request of human intermediaries. The research also elicited static factors such as demographic variables of users, but used them mainly for identifying potential biases.

INTERNET-BASED DIGITAL REFERENCE SERVICES (DRSS)

Internet-based DRSs are question-answering services that seek to fulfill the clients' information needs by receiving requests from clients and delivering responses electronically *via* the Internet. The intermediation between the users' requests and information provision can be performed either through human intermediaries (e.g., reference librarians, domain experts, etc.), or through an automatic interface (Lankes, 1998). Since this study sought to explore the use of human intermediation, the focus was on those services operated through human intermediaries.

With the exponential growth of Internet-based information services, users of DRSs have also been increasing dramatically. Internet-based DRSs have become increasingly important as people realize the present limitations of search engines (such as Yahoo, AltaVista, etc.) (Lankes, 1998; Wasik, 1998). Users of the Internet-based DRSs, however, have not yet been well studied, with the exception of a few occasional user surveys.

For this study, which sought to identify different tasks requested by users of human intermediaries and the

dynamically changing user's situations possibly associated with the generation of these requests, the Internet-based DRSs were ideal places to recruit respondents from whom the study data could be collected for the following reasons:

1 Clients of Internet-based DRSs have direct access to the Internet, because they send requests using the Internet. They can perform self-searching of electronic information on the Internet by themselves rather than making requests of these services. Thus, they should have reasons other than physical accessibility to the Internet for using human intermediation. This condition does not always apply to users of traditional mediated online search services – some users may make requests of human intermediaries because they do not have direct access to IR systems.
2 Clients of the Internet-based DRSs are relatively easy to identify because the request messages are accompanied by clients' e-mail addresses to which these services can deliver responses. Thus, recruitment messages for the study can be readily forwarded to the clients using these e-mail addresses.
3 Clients of Internet-based DRSs leave evidence of their use of human intermediation. Clients' requests and resulting interactions between the clients and the intermediary are kept in digital form in the archives of these services. Thus, the research can have access to this evidence by tracking down the archives.
4 Clients of Internet-based DRSs are expected to reflect a variety of settings. These services do not put severe restrictions on time and place for clients to make requests, compared to traditional face-to-face settings. Clients can use the service from any place where access to the Internet is available. They can send requests 24 hours any day of the week. They can use these services for a variety of purposes as long as the topic is relevant to the scope of the services. Thus, the situations of these clients should represent a variety of settings. This condition may not apply to conventional human-mediated reference services operated within an organization.

Based on the above, this study chose the AskERIC Online Question-Answering Service (AskERIC Q&A Service), one of the Internet-based DRSs, to recruit respondents.

RESEARCH QUESTIONS

This research was guided by the following three questions.

RQ1: What kinds of tasks do users request of human intermediaries?

This research question had two objectives: (1) to identify tasks users requested of human intermediaries from the users' perspective; and (2) to develop a taxonomy of tasks requested of human intermediaries.

RQ2: What situational factors do users perceive to be salient when they make requests of human intermediaries?

This research question sought to identify internal (cognitive and/or affective) and external (social and/or environmental) situations of users at the moment when they decided to make requests of human intermediaries.

RQ3: What patterns of associations, if any, are observed between users' situational factors and tasks requested of human intermediaries?

This research question explored possible associations between the situational factors users perceived as important at the moment when they decided to make requests of human intermediaries and the tasks they requested of human intermediaries.

STRUCTURE OF THE BOOK

This book consists of ten chapters. Following this introductory chapter, the next chapter (Chapter 2) presents an extensive review of literature that overviews the topic of this research. By identifying key concepts and defining terminology, the chapter first provides a general conceptual framework. The main emphasis of the literature review is on the literature on information problem solving (IPS) behavior of users of information retrieval (IR) systems and human intermediation, as well as on efforts in integrating IR and IPS research.

Chapter 3 overviews the general research approaches in conventional IR and IPS research in search for the optimal approach for this study. The phenomenon of the use of human intermediation might have been investigated from a wide range of approaches because there are many models and findings relevant to it. The study might have been designed to explore the phenomenon by starting from scratch without taking into consideration existing models and findings. Or, it could have been designed to take a positivistic approach to test hypotheses drawn from existing models and findings. By reviewing the literature, I was convinced that existing models and findings do not provide useful hypotheses to be tested for the purpose of this study because these studies are limited in scope. But at the same time, I considered that ignoring these theories and findings might go against the cumulative nature of scientific research (Kuhn, 1996). This situation led me to look for a third avenue to explore the phenomenon of human intermediation in naturalistic settings, to be able to identify new variables, but also to utilize existing models and findings as the initial framework.

In this chapter, three general approaches in the so called user-centered perspectives of IR and IPS research including cognitive, constructive and social approaches are identified. For the purpose of this study, the social approach was chosen because it explicitly accounts for the reciprocity of social action. Hence I consider that the use of human intermediation is a social phenomenon that exists not only in the mind of users but also in the objective world and that "there are some lawful, reasonably stable relationships" between a user's mind

and the objective world (Miles & Huberman, 1994, p. 4). The accountability to social situations was particularly important for the purpose of this study because it tired to capture human intermediation within the context of users' IPS processes that might involve social and interpersonal interaction among users and between users and human intermediaries.

Chapter 4 describes the research design and procedure applied in this study. Key methodological issues addressed are: assumptions underlying the research design, methodological challenges, research design, data collection and analysis techniques, and methodological limitations. The chapter argues for the adequacy of the naturalistic research approach taken by the study, and outlines the research activities in eliciting and building perspectives of users of human intermediation through iterative processes of data collection and analysis. Techniques applied in data collection and analysis including modified critical incident technique, top-down strategy of content analysis technique, and modified version of constant comparative method are fully described. Limitation inherent in research design including the choice of the AskERIC Q&A Service as the site for inviting study participants with the adequacy of sampling techniques used are also argued.

Chapters 5 through 9 present major findings of this study with some implications for existing models of IR and IPS research. Chapter 5 presents the taxonomy of tasks requested of human intermediaries developed in this research and provides answers to the first research question. Following the presentation of the taxonomy, the chapter describes a full process in which the taxonomy was developed with some explanation of problems encountered in applying the Big 6 model in data analysis and solutions that led to the modification of the initial framework. An unexpected finding of discrepancies of tasks requested of intermediaries between request messages and interview data are described, and major sources of such discrepancies are presented with the description of an exploratory analysis undertaken.

Chapter 6 reports a finding of key situational factors identified by the study as associated with the use of human intermediation and provides some answers to the second research question. Four dimensions of users' information needs including user goals, types of information sought, perceived importance of obtaining information, and use biases in information needs, as well as the modification of information needs, are described with patterns of associations among them. Three factors associated with the generation of users' IPS goals are described and discussed in their relation to time pressure and users' freedom in IPS processes. These factors are compared with artifact development activities. Two variables of social functions, namely "capacity" and "role" in IPS are discussed with relation to users' IPS goals. Relations between "role" and information sharing are also presented.

Chapter 7 presents findings on reasons for using human intermediation and provides some answers to the second research question. A list of reasons elicited from interview data for using the AskERIC Q&A Service in users' IPS processes is presented. Patterns of associations among reasons as identified by the analysis of casual

and temporal relationships between reasons are described in a graphic form. Unique patterns of relationships identified among reasons concerning three situational variables of (1) whether users did self-searching before making requests, (2) whether users had experience in using the AskERIC Q&A Service, and (3) perceived level of users' IPS skill will also be reported.

Chapter 8 reports findings concerning users' evaluation of the outcome of human intermediation. Two quantitative evaluation measures of "evaluation score" users reported for the outcome of the human intermediation, and "satisfaction score" they reported for the use of the AskERIC Q&A Service, as well as the relationship of these scores are described. The evaluation criteria of the AskERIC Q&A Service, a qualitative evaluation framework, developed through content analysis of users' articulation of reasons for providing a particular evaluation score are presented. A user-based evaluation of the AskERIC Q&A Service is presented with its strengths and weaknesses as seen from users. Both quantitative and qualitative evaluation are compared with four situational variables of users including (1) whether users did self-searching before making requests, (2) whether users' had experiences in using the AskERIC Q&A Service, (3) perceived level of users' IPS skill, and (4) users' IPS goals. The chapter discusses the interesting patterns of associations identified between evaluation of the AskERIC Q&A Service and four situational variables of users.

Chapter 9 reports study findings on associations between situational factors and tasks requested of human intermediaries, and provides answers to the third research question. Associations identified between multiple levels of user goals and tasks requested of intermediaries are presented. Associations between user goals and situational factors reported in previous four chapters are summarized. The chapter concludes with a graphical presentation of a conceptual model developed through synthesis of associations between user goals, situational factors and tasks users requested of human intermediaries.

Chapter 10 discusses the implication of study findings for practices of information services and system design. After addressing issues in limitations of the study's findings in informing to practices, their implications for the AskERIC Q&A Service and the ERIC system are discussed. Implications for human intermediaries and information system design are also argued with some suggestions for improving existing services and systems. The chapter concludes with the description of future research that is necessary to improve transferability of study findings and generalizability of the conceptual model of human intermediation developed in this study based on a users' perspective.

CHAPTER TWO

WHAT DO WE KNOW ABOUT USER BEHAVIOR IN HUMAN INTERMEDIATION

This chapter will provide an overview of the topics I consider relevant for this research. The main emphasis of the literature review is on the literature on information problem solving (IPS) behavior of users, especially human intermediation in relation to the use of information retrieval (IR) systems.

The literature review addresses:

- The characteristics of tasks performed in IR and IPS processes that provide a framework to view the use of human intermediation as a particular activity encompassed in these processes, and
- Potential factors that might be associated with the generation of the use of human intermediation within the context of naturally occurring IR and IPS processes.

CONCEPTUAL FRAMEWORK

In this section, major concepts central to this study are identified with some definitions of the important terminology used throughout this book. There are several different perspectives on and approaches to IR and IPS research within the field of information science. Traditionally, IR and IPS have been studied from the point of view of information professionals, such as librarians and information specialists, who provide information-related services to users. Though recent library and information science (LIS) research has shifted its focus toward the users' perspective (Dervin & Nilan, 1986; Suger, 1995), the literature tends to concentrate on users' self-searching processes. Accordingly, literature on human intermediation as seen from users' perspectives is limited. In addition, human IPS behavior, the domain of this study, is currently a focus of research in various fields external to information science, including psychology, philosophy, consumer research, management, economics, communication, mathematics, semantics, linguistics, ethno methodology, computer science, etc. (Savolainen, 1993). Such diversity inevitably introduces serious terminological confusion – several different

terms represent a similar concept, while a single term means different concepts when viewed from different perspectives, depending upon the researcher and the field of study. To avoid such confusion, this section defines key terms as they are introduced. Thus, most of the definitions in this section are uniquely developed for the purpose of this study based on synthesis of the literature, unless stated otherwise with reference to a particular literature.

INFORMATION PROBLEM SOLVING (IPS) AND INFORMATION RETRIEVAL (IR)

Information retrieval (IR) should be viewed in the broader context of users' information problem solving (IPS) process (Hert, 1997; Nicholas, 1995; Kuhlthau, et al., 1992). Before looking into the relationship between IR and IPS, several terms should be defined for the purpose of this study. They are: information retrieval (IR) systems, information retrieval (IR) interaction, information retrieval (IR) sessions and information problem solving (IPS).

A general concept of information retrieval is concerned with locating all kinds of desired information (Meadow, 1991). Therefore, the term *information retrieval (IR) system* is sometimes used to represent a variety of devices interposed between users of information and a collection of information sources. Consequently, an *IR system* may include such devices as a library catalog, indexing and abstracting journals and printed directories. In this study however, *IR system* refers to the computer system used to locate electronically stored digital information.

Traditional IR systems dealt mostly with static and textual information. That is, indexes and records are in text format and the content of each record does not change once added to the database. Reflecting the increasing availability of electronically stored visual information, particularly on the Internet, Dalrymple & Roderer (1994) used "database access systems" in place of IR systems to "acknowledge[s] the information sources... that are involved and substitute the broad concept of access for the narrower concept of searching" (p. 138). However, in this study, *IR system* includes Internet resource discovery tools, such as search engines and browsers, which are used to cover both the identification of resources and browsing of database content (Dalrymple & Roderer, 1994). Since contents of Internet Web sites are constantly updated, this study covers IR systems dealing with dynamic databases, which are "the knowledge potentially available to an information seeker" (Marchionini, 1995, p. 38). On the other hand, computer-mediated communication of electronic messages between and among individuals, such as electronic mail and listservs, is not considered an *IR system* in this research.

Thus, for this book, the definition of an *information retrieval (IR) system* is:

> a system that stores, organizes and provides access to potentially relevant information in digital format in static or dynamic databases.

The definition of *IR interaction* is:

> a purposeful "interactive communication process[es] that occur[s] during the retrieval of information by involving all the major participants in IR, i.e. the user, the intermediary and the IR system" (Ingwersen, 1992, p. viii).

This term represents a view that the searcher (user and/or intermediary) of the IR system is integrated as a part of the IR process, in contrast to the traditional system-oriented view in which the searcher is considered to be external to the process (Dervin & Nilan, 1986; Hert, 1995). Thus, interaction between users and intermediaries, as well as between people and IR systems, is included. An *IR interaction* begins with an initiation of a search request by a user and ends with the user receiving search result from the IR system or the intermediary.

The definition of *IR session* is:

> the online activity that occurs as a result of a particular query or line of [inquiry] (Nicholas, 1995, p. 53).

Thus, for the purpose of this research, IR session is limited to IR interaction between people and IR systems. In traditional IR systems, this begins with logging in and ends with logging off (Nicholas, 1995).

For this book, the definition of *information problem solving (IPS)* is:

> the active search for and processing of information over a period of time, with specific goals or tasks to be accomplished, and not completely taken for granted.

Other terms such as "information-seeking" (Hert, 1996; Allen, 1996) and "information search" (Kuhlthau, 1992) are used to represent the same concept.

INFORMATION PROBLEM SOLVING AS A PROCESS

The term IPS was originally coined by Eisenberg and Berkowitz (Eisenberg & Berkowitz, 1995) to present a model of an information-oriented problem-solving approach to library and information skills instruction called the "Big 6." They proposed that IPS is a process consisting of six stages: (1) task definition; (2) information-seeking strategies; (3) location and access; (4) use of information, (5) synthesis, and (6) evaluation[1].

[1] The model is presented in Appendix B1 (1).

Similar models consisting of slightly different stages are proposed by several other researchers. For example, Kuhlthau (1985, 1988a, 1988b, 1988c, 1992) proposes a six-stage model of the "information-seeking process (ISP)" based on a series of empirical studies of high-school and college students. Irving (1985) presents a nine-stage model of "information skills." Striping and Pitts (1988) propose a 10-step model of a "thinking process" for library research. Eisenberg and Brown (1992) found an "overriding similarity" among these process models and advocate a "common process approach to library and information skills education" (p. 105).

Bates (1981) categorizes models of search process into four types: models for idealizing searching (type 1), models for representing searching (type 2), models for teaching searching (type 3), and models for facilitating searching (type 4). Among the above-mentioned IPS models, Kuhlthau's model of search process is type 2 because it was developed and validated empirically mostly in educational settings. Other IPS process models were developed from the researchers' experience but were not empirically tested. In addition, these models are largely used for educational purposes, to develop students' information skills in order to make them self-sufficient information problem solvers (type 3 or type 4). Thus, all IPS models found in the literature and mentioned above are developed and used within educational settings.

White (1992) proposes to distinguish IPS activities for "educational purposes" and for "informational purposes." According to White, IPS activities for "educational purposes" emphasize learning IPS skills in order to become independent information searchers, while those for "informational purposes" emphasize completing the IPS task by obtaining appropriate information in time. The user population sought in this study is not limited to students. Thus, users may not conduct IPS activities for "educational purposes" of learning IPS skills but rather to perform IPS for "informational purposes." As purposes of educational and informational IPS differ, so too their processes may differ. Thus, IPS process models in educational settings might not necessarily represent IPS processes for informational purposes.

Moreover, these educational IPS models may be applicable only for the "externally imposed query" but not for the "internally developed query." Gross (1995) argues that, in educational environments, students perform IPS activities more or less by "externally imposed query" because they are given IPS goals (e.g., assignment of writing papers) with a limited range of available topics by their teachers. On the other hand, independent searchers with internally developed information needs would conduct IR interaction based on "self-generated queries." According to Gross (1995), the IPS process of "externally imposed query" is completed not at the time they find information but after searchers communicate what they've found to the imposer. Thus, IPS models for educational purposes may be limiting in accommodating IPS activities resulted from self-generated queries.

As Bates (1989, p. 410) advocates in her "berrypicking" model, IPS is a process in which each "new piece of information [users] encounter gives them new ideas and directions to follow." This research took Bates's

perspective into account to maintain the view that human information-seeking is a process. In short, the term IPS is used in this study to represent the process-oriented view of human IPS behavior and try to capture human intermediation as its part. At the same time, the study utilized the *Big 6 Model* of IPS as a guide to relate IR with IPS. The main reason for the selection of the *Big 6 Model* over other IPS process models was that it explicitly presents the information use (step 4) and synthesis (step 5) components that are likely to be highly critical in differentiating tasks requested of human intermediaries. Also, the *Big 6 Model* has been acknowledged to be flexible in capturing IPS processes of a variety of people in different settings (Eisenberg & Lowe, 1997). Thus, this model seems more useful than others for this research.

INTEGRATING IR AND IPS RESEARCH

This research regards *IR interaction* as a particular activity encompassed in IPS processes. Traditionally, IR and IPS research have developed separately. Traditional system-oriented approaches to IR research have considered searchers (both users and intermediaries) as external to the IR process, while traditional user studies have posited IR systems as sources or channels. Recently, researchers who take user-centered perspectives have been trying to incorporate IR interaction as a part of IPS processes by studying direct IR interaction between users and IR systems. This research is expected to contribute in the same vein but expand the concept of IR interaction by including interaction between the user and the intermediary so as to capture IR interaction as involving the user, the intermediary, and the IR system.

The following section reviews those approaches to examine how far researchers have gone in integrating IR and IPS processes.

Interactive Clarification of Information Problems

Assuming that a user in an early stage of IPS may not be able to explain the need for visceral information need as suggested by Taylor (1968), Oddy (1977) demonstrated the process of users to interact with IR systems without initially describing their information needs, but rather to dynamically define them through IR interaction in his Thomas IR system. Following the assumption, Belkin and his colleagues (Belkin, 1980; Belkin, Oddy & Brooks, 1982a, 1982b) propose to see *IR interaction* as a communication process in which users are receivers of information, and develop an *anomalous state of knowledge (ASK) hypothesis*. This hypothesis stresses the inability of users to describe their information needs accurately and completely. Based on the *ASK hypothesis*, they try to integrate user components into IR system models in order to provide a basis for an IR system design which includes dynamically changing users' information needs (Belkin, et al., 1987; Daniels, 1987). In other words, they try to develop an IR system model of human intermediaries based on intermediaries' perspectives. On the other hand, Hert (1995, 1996) proposes a model that posits IR interaction as a part of higher-level IPS process and conceptualizes how users' information needs, translated as user goals, guide the users' *IR interaction*.

The process of defining users' information needs through *IR interaction* captured by the above-mentioned user-centered IR research may be superimposed over the first three steps of the *Big 6 Model*. They are: (1) task definition (i.e., clarification of information need or goal); (2) information-seeking strategies (i.e., selection of IR systems, databases, terminology, and/or approaches); and (3) location and access (i.e., interaction with the system and/or database). However, none of these models includes the information use and synthesis components that are represented as steps 4 and 5, respectively, in the *Big 6 Model*. Similarly, none of the existing IR models examined explicitly pointed to the information use and synthesis components of the IR. In fact, little empirical research of *IR interaction* focused on information use or post-search information processing behavior (e.g., reading, extracting, and synthesizing of search results) of users or intermediaries. Instead, most of the empirical studies of IR user behavior stop data collection at the point when users evaluate search output, e.g., by relevance or satisfaction. However, it is not clear whether these researchers consider information use as external to the scope of IR research.

Weak Relevance in Bibliographic IR Interaction

One of the plausible explanations for the exclusion of the information use component in IR models or IR research may be due to the limitation of IR systems of bibliographic databases used in conventional research. In order to capture information use behavior, researchers need to examine, first of all, whether or not the user actually obtains the original documents.

This problem is well described by Hert (1995, 1996), who investigates *IR interaction* of OPAC users by combining the multiple qualitative methods of interview, observation (video-recording) and search log analysis. She reports that users' information needs are constant with minimal modification throughout the OPAC interaction. Hert (1996) explains this rather unexpected finding as the consequence of Harter's (1992) "weak relevance." That is, OPAC users terminate their *IR interaction* based on the relevance of surrogates (i.e., metadata of books, periodicals, or articles) rather than the actual content of documents. The relevance judgment for surrogates is tentative and weak, because the user may not obtain or read the fulltext of documents, or s/he may find them irrelevant after s/he has obtained and read them.

Hert (1996) suggests that even if the user's goal does not change during OPAC interaction, it may change when the user examines the documents themselves. She further proposes that *IR interaction* with fulltext databases may reveal major modification of information needs, as demonstrated by Marchionini (1989). *IR interaction* with fulltext databases may also provide an opportunity to include information use components in IR processes by examining how users or intermediaries read fulltext of search results to extract and synthesize information, while interacting with the system.

Multiple Session Model of IR Interaction

Saracevic, et al. (1991) propose a *multiple session model of IR interaction* based on the analysis of data collected from 40 naturally occurring mediated searching processes in an academic library. They found that 45% of participants had performed previous mediated searching on the same topic mostly with the same intermediary. This finding implies that multiple IR sessions occur in an IPS process. Spink (1997a) further inquires into this model by interviewing 200 academic users of OPAC and CD-ROM databases in order to investigate users' self-searching IR sessions over time within an IPS process. She found that a majority of participants (56.5%) had conducted more than two IR sessions in an IPS process and that they mostly (79.5%) conducted a first search session in an IPS process at the initial stage of their IPS and subsequent sessions at the later stages.

Based on these findings, Spink proposes the evolving nature of *IR interaction* in which users conduct multiple sessions while developing and modifying their search terms and strategies over subsequent search sessions. Based on an analysis of 40 mediated searching processes, Kuhlthau, et al. (1992) propose a way to view the multiple IR session model within a framework of her information search process (ISP) in which IPS process is seen as a "process [that proceeds] through a series of cognitive stages through which users progressively refine and reformulate their information problem" (p. 67).

Even though these *multiple session models* do not explicitly suggest so, the different modes of *IR interaction* (i.e., self-searching and use of human intermediation) may occur at different stages of IPS process. For example, a user with a visceral or conscious information need (Taylor, 1968) in ASK (Belkin, et al.,1982a, 1982b) may conduct self-searching at the initial stage of the IPS process. Through the self-searching as well as interaction with other sources, the user's thought may evolve and the information may need to become more focused so that s/he may be able to communicate it with colleagues or professional intermediaries in order to make a search request. This seems to be a plausible scenario for academic users who tend to make prior efforts to locate information before using human intermediation in mediated mode. However, it may not apply for business users who seldom attempt to locate necessary information prior to their use of human intermediation (Sandore, 1990). Thus, the multiple session model of IR should be extended to include different modes. The reason for different behavioral patterns of academic and business users as implied by Sandore's findings should be investigated as well.

Post-Search Information Processing

Relating information use to IR processes is also important to obtain an adequate explanation of why and how much post-search information processing may be performed by the user and the intermediary. Assuming that *IR interaction* is a communication process (Katzer, 1987; Wilson, 1981), the intermediaries perform *IR interactions* based on their understanding of users' requests, which presumably reflect the information needs, or goals of the users. After the intermediary gets reasonably relevant search output, s/he may perform some sort of post-search information processing (e.g., read, evaluate, and synthesize the search result) to make it

readily usable for the user's goal. If the user is an important client for the intermediary and the intermediary has confidence in her/his own understanding of the users' information need, then it is quite reasonable to assume that the intermediary would put much effort into post-search information processing so as to present an optimal search outcome readily applicable for the user.

However, only a few empirical studies of IR user behavior reviewed focus on the post-search information processing of intermediaries (Wilson, 1999). On the other hand, some anecdotal evidence suggests that librarians perform post-search information processing in business and industrial environments. According to Bell (1990), in industry, "on numerous occasions department directors were asked by their supervisors, usually vice presidents, to complete comprehensive reports on a particular topic in a very short period of time" (p. 53). Comparing his experience as an online searcher in an academic and a corporate environment, Carey (1985) reported that "I edit search results for inclusion in memos and proposals. The job is not just finding information online, but making it attractive as a product so that the patron can use it in various ways" (p. 56).

By contrast, based on a series of interviews of users in corporate libraries, O'Day & Jeffries (1993a) report that almost all the regular clients of online search services in corporate libraries he studied perform this post-editing function to develop artifacts in order to communicate the search results to their colleagues and ultimate users. The format of the artifacts developed by these clients includes annotated excerpts, summaries, reports, spreadsheets, charts, graphs, slides, visuals, etc. O'Day and Jeffries call these clients "information artisans" and categorize the pattern of information sharing into four types: (1) updating team members, (2) broadcasting, (3) consultant, and (4) archiving. According to him, the degree of post-processing differs depending upon the type of sharing – ad hoc broadcasting and archiving require minimal processing, while consulting and team sharing involve the development of higher-level information products with complex analysis. Even though O'Day and Jeffries (1993b) found that post-search information-processing tasks are mostly done by library clients rather than librarians, they report on two cases of business consulting firms in which librarians who acquire domain expertise performed some or all of the first-hand analysis to produce synthesized search reports.

Based on O'Day and Jeffries's (1993a, 1993b) findings as well as some anecdotal evidence presented above, this research assumes that some degree of post-processing is performed either by users or by intermediaries. This is because the intermediaries need to communicate search results to users and users may need to share the search outcome with other people.

HUMAN INTERMEDIATION IN IR AND IPS

This study focuses on a particular search tactic[2] employed by a person in accessing and using a variety of IR systems, namely, the *use of human intermediation.*

[2] Here, the term "search tactic" is used to mean "a move made to further a search corresponding to the situation" (Bates, 1979a, 1979b).

User vs. Intermediary

Most of the existing studies distinguish between users and intermediaries based on their formal functions rather than the role performed by searchers. This research will follow such distinctions, but the *role* of users is further distinguished situationally based on the context of the IPS process.

Instead of "users," the term "end-users" is often used in the literature to represent searchers who performs *IR interaction* by themselves based on their own information needs (Buntrock & Valicenti, 1985). However, "end-user" was originally coined to mean a person for whom the librarian did searches (Ojara, 1986). Trying to resolve this confusion, Janke (1985) uses "client searcher" to mean "anyone who, as a patron of an institutional online service, chooses to run his own search," in contrast to "lay searcher" which he defines as "anyone who conducts his or her own online searches, regardless of environment" (p. 13). Any of these terms, however, seems to represent the view of professional intermediaries who categorize searchers into information professionals and non-information professionals. They collectively label the non-information professional searchers as "end-users" or "client searchers" without taking into account the fact that some non-professional searchers may act as intermediaries and perform the IR-interaction for other users. On the other hand, Bawden (1990) refers to users as information professionals in his user-oriented evaluation.

In this research, users are defined as clients of human intermediaries. Thus, for the purpose of this research, a *user* is defined as:

> a person who uses human intermediaries in her/his IR and/or IPS processes.

However, the definition does not necessarily imply that users always use human intermediation to use IR systems. They may perform self-searching by directly manipulating IR systems. The *user* may be an *originator* who generates an information need, a *collaborator* who takes part in IPS project involving multiple people, or a *proxy* who represents other people's information needs.

Before IR systems became directly accessible to users, most of the IR sessions involved trained information professionals such as librarians and professional searchers (Hawkins, 1981; Eisenberg, 1983). However, the literature often reports cases in which people other than professional intermediaries perform the *IR interaction* on behalf of users (Mischo & Lee, 1987; Ojara, 1986; White, 1992; Nicholas, et al., 1986; Nicholas, 1996).

On the other hand, researchers in information science have investigated people who act as mediators for other people to facilitate their IPS. For example, the emergence of "technological gatekeepers," as coined by Allen (1977), has frequently been reported as a result of IR user training in industrial environments (Richardson, 1981; Cole & Bawden, 1996). In fact, Metoyer-Duran (1993) examines the role of gatekeepers in ethnolinguistic

communities and predicts the emergence of electronic gatekeepers[3] who act as filters of electronic information to a group of users.

Some researchers try to define the new role of professional information intermediaries in a way that expands the traditional function of librarians. For example, Dosa (1985) introduces the concept of the "information counselor" who is engaged in locating, obtaining, evaluating, synthesizing and interpreting information resources, as well as in giving advice to users' on their information problems.

Recently, the term intermediary is sometimes used to mean "software that performs search assistance functions that have traditionally been performed by human intermediaries" (Dalrymple 1994, p. 139). This study, however, assumes the intermediary to be a human.

For the purpose of this study, the definition of the term *intermediary* is:

> a person who performs IR sessions on behalf of a user. This person may be a trained information professional such as a librarian or information specialist, but can be anyone.

Self-Searching vs. Human Intermediation

In an environment where direct access to both IR systems and human intermediaries is readily available, a user who wants to obtain information from an IR system has a choice of finding information by directly manipulating IR systems or making a request of a human intermediary.

The first choice is *self-searching* in which users interact with the IR system directly by manipulating the system with or without the help of the intermediary (Hurt, 1983). This alternative is also called ***direct mode*** (Deschatelets, 1982). In *self-searching*, users interact directly with IR systems during the IR session.

As stated above, the definition of a *self-searching* for the purpose of this research is:

> an ***IR interaction*** in which users interact with IR systems directly and conduct the entire IR session by themselves.

[3] She said, "as the National Research and Educational Network (NREN) emerges and extends throughout the educational system, human gatekeepers and the population they serve may draw on gateways and the so-called electronic gatekeepers that serve as information filters to a community of users" (p. 111).

The other choice is to make a request of a human intermediary to manipulate IR systems on behalf of users. This choice is called *human intermediation* in this research and is defined as:

> a search tactic or action employed by a user in which a user relies on a human intermediary in performing an IR and/or IPS task on behalf of the user.

Since this research considers IPS as a process that may include *IR interaction*, both *self-searching* and the *use of human intermediation* are also seen as activities encompassed within a user's IPS process.

Level of Interactivity in Human Intermediation

The term *interactivity* is defined as:

> the propensity to act in unison with external objects or other people (Marchionini, 1995).

IR interaction and human intermediation imply interactivity. In self-searching, interaction occurs between the user and the IR system. In human intermediation, interaction is assumed both between the user and the intermediary and between the intermediary and the IR system. In fact, the IPS process itself is an interactive process that "depends on initiatives on the part of the user, feedback from" the IR system (in self-searching) and from the intermediary (in mediated searching), "and decisions for subsequent initiatives based on this feedback" (Marchionini, 1995, p. 17).

Different levels of *interactivity* between the user and the intermediary are assumed for human intermediation. In other words, the human intermediation may be initiated either by a face-to-face or telephone interview or by written communication from the user to the intermediary as a one-shot request to which the intermediary responds with the answer.

FINDINGS ON HUMAN INTERMEDIATION IN IR AND IPS RESEARCH

A great deal of the literature in library and information science (LIS) reports findings on human intermediation. This section begins with the historical development of IR systems and services to provide a general trend of *IR interaction* shepherded from the dominance of human intermediation toward self-searching by users. The rest of the section focuses on the characteristics of IR sessions performed by human intermediaries in comparison to those of users' self-searching, tasks performed by intermediaries in human intermediation, as well as the characteristics and situations of users who use human intermediation in comparison to those of self-searchers.

OVERVIEW OF HISTORICAL DEVELOPMENT OF IR SYSTEMS AND SERVICES

The advance of IR systems with their impact on users' IPS behavior in libraries has been extensively reviewed by Hawkins (1981), Mischo and Lee (1987), Nicholas and Harman (1985), Dalrymple and Roderer (1994), and Nicholas (1995).

Historical Background

The concentration of existing studies on the comparisons of search processes performed by users with those by intermediaries upon requests of users seems to reflect the historical development of IR systems and services in various types of libraries and information services. The introduction of commercial online bibliographic IR systems in the early 1970s was originally intended to provide enhanced access for users. But librarians and professional intermediaries were the major users of these systems they performed searches on behalf of users for the following reasons:

- variability of command and search interfaces among different vendors,
- rapid increase in the number of databases available through different vendors,
- complexities of search-strategy formulation and search logic,
- lack of standardization in database structure, and
- substantive costs of online searching and printing (Eisenberg, 1983; Hawkins, 1981; Mischo & Lee, 1987).

Since the 1970s, increased availability of and enhanced accessibility to a variety of IR systems, including online public access catalogs (OPACs), locally mounted bibliographic databases, as well as stand-alone and networked CD-ROMs, have provided users with multiple means of accessing and using electronically stored information without direct charge. In addition, an increased variety of numeric, fulltext and visual databases have provided users with enhanced opportunities for directly interacting with IR systems. Training activities aimed at encouraging self-searching of IR systems among users of commercial bibliographic databases were expanded in the 1980s with the increased availability of more or less user-friendly search systems (Mischo & Lee, 1987).

User searching behavior with respect to consumer online services such as CompuServe and America Online has not been thoroughly studied. In spite of their popularity among users, the literature merely reports demographic characteristics of typical users as highly educated professional or executive white males (Nicholas, 1995).

Recent widespread use of the Internet with a variety of search engines and browsers has provided users with another alternative IR system. A great deal of information on a local, national and global scale is accessible through this alternative. Access to the Internet has been expanded from academic to public and industrial

environments. Consequently, free or inexpensive textual and factual data in a variety of domains have become available to users. Increased access to a variety of IR systems through multiple alternatives has provided users with a more or less information rich environment in which they have access to some or all of the above-mentioned IR systems through self-searching and/or human intermediation.

Internet-Based Digital Reference Services (DRSs)

Digital reference services (DRSs) are online question-answering services that attempt to fulfill the information needs of their clients. They are also known as "AskA services" (Lankes, 1998; Wasik, 1998). The intermediation between clients' requests and information provision can be performed either through human intermediaries or through automatic interface (Lankes, 1988). Typically, these services respond to online inquiries of clients by directing them to relevant electronic or print resources and/or providing factual information. If the clients' requests are ambiguous, an online reference interview may be generated by human intermediaries to help define clients' information needs (Lankes, 1998, Wasik, 1998; Ryan, 1996).

With the expansion of the Internet, DRSs become available on the Internet and are getting increasingly popular as people realize the disorganized nature of Internet resources and limitations of search engines (Janes, 1996). The number of requests received by some of the Internet-based DRSs is growing exponentially (Lankes, 1995, 1998). These services are offered either free of charge or are fee-based. They are not necessarily affiliated to libraries – some of them are affiliated to libraries and intermediation is performed by librarians, while others are affiliated to a variety of organizations and staffed by domain experts and/or librarians including volunteers (Ryan, 1996; Wasik, 1998). Most of these services are open to the general public Internet community, but some of them restrict their client base in order to limit the number of requests received (Wasik, 1998).

Clients of Internet-based DRSs have access to both self-searching of Internet web sites using search engines and human intermediation provided by these services. Thus, these clients have the choice between *self-searching* and *human intermediation* if they want to search for information on the Internet. Therefore, it is interesting to examine why and in what situations they use DRSs. Published research on Internet-based DRSs is, however, concentrated on activities and management concerns of service providers (Ryan, 1996; Lankes, 1998; White, 1999). As a result, the behavior of their clients is not well studied. Except for occasional user surveys conducted by service providers, the literature provides little information about their users.

Research Trends in IR Behavior

As described above, the general trend of IR activities has shifted from human intermediation toward self-searching by users. However, this trend does not necessarily mean that all users have adapted to self-searching. Instead, numerous studies report on the emergence of electronic gatekeepers among users (Richardson, 1981; Bodtke-Roberts, 1983; Arnold, 1987; Seefeldt & Thomas, 1986; Nicholas, et al., 1986; Cole & Bawden, 1996). These electronic gatekeepers perform searches of IR systems on behalf of other users. In addition, human-

mediated DRSs in the Internet environment have become increasingly popular. Some of the users who have direct access to more or less user-friendly IR systems, such as the Internet search engines, are still relying on human intermediation offered by Internet-based DRSs.

Existing studies concerning human intermediation generally aim to address the following:

- The characteristics of the search process performed by users compared to that performed by information professionals,
- Tasks performed by intermediaries in human intermediation, and
- The characteristics of users who perform self-searching and those who use human intermediation.

Following sections review findings of existing studies of users' *self-searching* and *human intermediation* as seen from information professionals' view.

SEARCH PROCESS OF USERS AND INFORMATION PROFESSIONALS

A great deal of LIS literature reports on search processes of either self-searching done by users or mediated searching performed by professional intermediaries or both. Table 2-1 compares and contrasts empirical findings of *IR interaction* performed by users with that by professional intermediaries for several dimensions. Each dimension is discussed further with relevant findings in the following section.

General Characteristics of Search Process

LIS literature reports several characteristics of users' search process as distinct from those of information professionals. This section summarizes these characteristics of search process variables.

Preparation

Based on professional intermediaries' standards, users do not make sufficient preparation before starting online sessions. Users use limited sources for term selection. By contrast, professional intermediaries generally make more efforts in preparation and use more thesauri and dictionaries for term selection. However, Hsieh-Yee (1993) reports that even professional intermediaries put less effort in preparation before searching a familiar topic (library science) than an unfamiliar topic. Thus, the amount of time and effort spent in preparation may not reflect the higher quality of the search conducted by professional intermediaries but simply the results of a lack of domain knowledge held by the professional intermediaries. Hence users are believed to have better domain knowledge of the topic of the search than professional intermediaries (Saracevic, et al., 1988; O'Day & Jeffries, 1993a, 1993b; Spink, 1997b). Thus, it is natural for them not to expend much effort in preparation for the search.

Table 2-1: Findings of Search Process

Process Dimension	Self-Searching by Users	Searching by Intermediaries
Preparation	Do not have sufficient preparation (Janke, 1984) Use limited sources for term selection (Salovaara, 1988; Hsieh-Yee, 1993)	Make efforts in preparation (Hsieh-Yee, 1993) Use more thesauri and dictionaries for term selection (Salovaara, 1988; Hsieh-Yee, 1993)
Strategy	Simple and straightforward (King, 1991) Fail to use alternative approaches (Kirby & Miller, 1986; McKibbon, et al., 1990)	Great variability among searchers (Fenichel, 1981; Fidel, 1981; Harter, 1984; Saracevic, et al., 1988; McKibbon, et al., 1990; Hsieh-Yee, 1993)
Search Terms	Don't distinguish between natural language and controlled vocabulary (Hsieh-Yee, 1993) Use natural-language (Walton & Dedert, 1983; McKibbon, et al., 1990; Hsu, 1991) Don't use controlled vocabulary (Walton & Dedert, 1983; Kirby & Miller, 1986; McKibbon, et al., 1990)	Use more controlled vocabulary (Fenichel, 1981; Harter, 1984; Lancaster, et al., 1994) Use more synonyms and try more term combinations (Hsieh-Yee, 1993) Overlap in selection of terms is quite low (Saracevic et al., 1988)
Command	Use less-advanced search commands (Fenichel, 1981; McKibbon, et al.,1990)	Use more variety of commands (Fenichel, 1981)
Interactivity	More interactive (Fenichel, 1981; Marchionini, 1995; Marchionini, 1989; Shenouda, 1990) Browse online (Fenichel, 1981; Haines, 1982; Marchionini, 1995; Nicholas, 1995) Pay more attention to the interim results (Marchionini, 1995) Use feedback to reformulate searches (Marchionini, 1989) Fail to take advantage of feedback (Jacobson & Ullman, 1989)	Less interactive (Fenichel, 1981; Lancaster, et al., 1994) Perform fast-batch online search (Fenichel, 1981; Harter, 1984) Browse online less frequently (Harter, 1984) Do not pay much attention to interim results to take advantage of feedback (Saracevic, et al., 1988) Rely on indexing terms or journal title and date in examining and reformulating searches (Hsieh-Yee, 1993)
Errors	Make more non-typographic errors (Fenichel, 1981; McKibbon, et al., 1990; King, 1993)	Make same level of typographic errors as users (Fenichel, 1981)
Databases Used	Use single or a few databases (Salovaara, 1988; Ikeda & Schwartz, 1992; Hart & Rice, 1991; Dalrymple & Roderer, 1994) Use fulltext databases (Hart & Rice, 1991)	Use more databases (Salovaara, 1988) Use bibliographic databases (Hart & Rice, 1991)
Output	Satisfied with abstracts and no need to obtain fulltext (Salovaara, 1988; Haynes, et al., 1990)	Overlap in retrieved items is quite low (Saracevic et al., 1988; McKibbon, et al., 1990)

Search Strategy

Search strategies employed by users are simple and straightforward. They fail to use alternative approaches when the initial approach does not provide satisfactory results. In contrast, professional intermediaries use more sophisticated search strategies and try different approaches when the initial strategy fails. However, a majority of the literature reports a great variability observed among approaches employed by professional intermediaries even for the same request (Saracevic et al., 1988; McKibbon, et al. 1990; Lancaster et al., 1994). In short, even though professional intermediaries seem to use more sophisticated strategies compared to users, the variability among professional intermediaries is so great that systematic differences between professional intermediaries and users seem trivial.

Search Terms

Reflecting the lack of preparation, users do not use a controlled vocabulary but use natural language. They don't distinguish between natural language and controlled vocabulary. However, there is one exception. Based on a questionnaire survey of faculty members in an academic medical environment, Hsu (1991) found that 65% of respondents use MeSH[4] quite often. However, this finding may be due to the difference in perception for the meaning of "often" held by users and professional intermediaries[5]. In contrast, information professionals generally use more controlled vocabulary and more synonyms, and try more term combinations. However, different information professionals use different terms for the same request – overlap in selection of terms among information professionals are quite low even for the same request (Saracevic, et al., 1988). Moreover, professional intermediaries use their own terms rather than controlled vocabulary for searching a familiar topic (library science) while using more synonyms and controlled vocabulary for an unfamiliar topic (Hsieh-Yee, 1993). Thus, the use of controlled vocabulary and synonyms may not necessarily reflect the difference between users and professional intermediaries but the difference in their domain knowledge of the search topic.

Search Command

Users use fewer and less-advanced commands compared to professional intermediaries. This may reflect users' lack of experience with a particular IR system, but experience with an IR system does not increase users' use of advanced system features (King, 1991; Nicholas, 1995).

Interactivity

Users are more interactive than professional intermediaries. They use feedback to reformulate their searches rather than planning search strategies in advance. Thus, they browse extensively while online and pay more attention than professional intermediaries to the interim results, particularly in searching fulltext databases.

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[4] Medical Subject Heading, the controlled vocabulary used in MEDLINE and other databases developed by the National Library of Medicine (NLM).

[5] Fidel (1991) found that 64% of search terms used by professional intermediaries in medicine were controlled vocabulary. This ratio far exceeds the average share of controlled vocabulary in science and technology, social sciences, humanities and general.

Users use feedback to reformulate searches. However, some users fail to take advantage of feedback, due to the lack of knowledge on how to use system functionality.

On the other hand, professional intermediaries perform least-interactive online search – they do not use the interactive capability of online systems (Fenichel, 1981). They browse online less frequently and do not pay much attention to interim results to get the advantage of feedback. When they do, they rely on indexing terms, journal title and date of publication in examining and reformulating searches for unfamiliar topics even when abstracts are available (Hsieh-Yee, 1993).

Errors

Users make more non-typographic errors such as errors in the use of Boolean operators and inappropriate use of controlled vocabularies. However, information professionals make the same level of typographic errors as users. A large share of non-typographic errors made by users may reflect the lack of understanding of the system features and search logic by users as suggested by Borgman (1996).

Database Used

Users use single, or a smaller number of, databases compared to professional intermediaries. Self-searching of bibliographic systems in academic environments is characterized as use of a single database, but multiple databases are frequently used in some non-academic environments (Vollaro & Hawkins, 1986; Nicholas, 1995). Type of database used may differ. Users tend to search fulltext and numeric databases directly while making use of human intermediation for bibliographic databases of professional intermediaries (Hart & Rice, 1991).

Search Output

Two studies in non-academic environments report that users are generally satisfied with abstracts and do not request fulltext as the results of self-searching of bibliographic databases (Salovaara, 1988; Haynes, et al., 1990). They attribute this finding to the exploratory nature of self-searching. Reflecting the difference in search terms used by different professional intermediaries for the same search request, overlap of retrieved items for the same request among different information professionals is found to be quite low. However, Saracevic, et al. (1988) suggest that items retrieved by more than two professional intermediaries for the same request have higher chances of being relevant.

Sources of Variability Among Professional Intermediaries

As described above, empirical research to date on human intermediation reveals a great variability among the search processes and search results even for the same request. A few researchers are inquiring into the source of variability among information professionals in selection of terms and approaches. So far, individual differences of search style of searchers and difference in the level of domain knowledge among searchers have been empirically investigated as sources of such variability.

Individual Differences

Fidel (1991) explored search processes performed by 47 professional intermediaries (i.e., online searchers) in human intermediation using verbal and protocol analysis with observation. Based on the analysis, she proposed that the use of controlled vocabulary differed depending upon domain of the topic of search, type of question as well as type and number of databases used. She reported that science searchers (except for the medical domain) used more textwords[6] than searches in other subject areas, that searchers who deal with practical questions tended to use more textwords than those who addressed theoretical questions, and that searchers using multiple databases tended to use textwords more often than those who used a single database (Fidel, 1991). She also found that searchers consulted thesauri only when they used databases accompanied by high quality thesauri. Based on these findings, she concluded that selection of search keys was situational. She suggested that there were two types of professional searchers: operationalists and conceptualists (Fidel, 1981; Fidel, 1991). Operationalist searchers tended to employ operational "move[s] that use[s] the system features in order to modify a retrieved set [to improve precision] without changing the conceptual meaning it represent." On the other hand, conceptualist searchers used conceptual moves that "modif[y] a retrieved set by modifying the meaning of the concept it represents" (Fidel, 1981, p. 68) to improve both recall and precision. She further argued that operationalist searchers tended to put less effort in preparation, use textwords obtained from users and avoid controlled vocabulary, they used more search commands to improve the search interactively. She also claimed that operationalist searchers put less emphasis on recall than conceptualists. Based on the above, Fidel concluded that operationalists tended to be more interactive than conceptualists. She further proposed that interactivity is an inherent characteristic of the searcher rather than developed through experience or training. She also argued that domain knowledge is required to change the concept, and therefore, conceptualists may have better domain knowledge than operationalists (Fidel, 1991).

Domain Knowledge of the Topic of Search

Hsieh-Yee (1993) inquires into the effect of domain knowledge and search experience on *IR interaction* by comparing search tactics used by novice users and experienced information professionals[7], using the same two artificially developed questions – one corresponds to the domain of users, the other is in library science. She found professional intermediaries tend to use more controlled vocabulary, spend more effort in preparing the search, monitor the search more closely, and include more synonyms and more terms for searches in unfamiliar areas. But they use their own terms and spend less effort in preparation when searching regarding the issue of library science. On the other hand, the use of search tactics by novice users does not reveal any significant difference between familiar and unfamiliar topics. Based on these findings, she concludes that subject knowledge affects only experienced searchers. But I think this conclusion may be limited, because

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6 Fidel (1991) categorized search keys used by intermediaries she studied into textword and thesaurus word. Textwords are words are non-descriptors or search keys not included in a thesaurus.

7 Because she defined experienced searchers as "professional searchers who have at least one year of search experience..." she compared professional intermediaries with end-users rather than experienced searchers with non-experienced searchers.

she did not include experienced searchers who are experts in the area other than library science as participants in her study. Hence it may be the case that different tactics used by professional intermediaries in searching an unfamiliar area in her study may reflect their professional training focused on searching in unfamiliar domains rather than pure search experience. As reported by King (1991) and Nicholas (1995), experienced users do not use a wider scope of system features compared to inexperienced ones. Thus, search processes of experienced searchers who do not have professional training in library and information science may be different from those of professional intermediaries. In order to confirm domain knowledge and search experience to be significant factors in improving *IR interaction*, the use of tactics by non-professional domain experts who have extensive search experience, such as electronic gatekeepers, should also be compared with tactics used by novice users.

On the other hand, based on an analysis of naturalistically occurring human intermediation, Spink (1993) proposes that domain knowledge held by users associates with higher precision of the search results only when they have some experience of human intermediation within the same IPS process. These findings imply that a combination of domain knowledge and search experience within a specific IPS process may lead to a successful *IR interaction*.

Conclusion on Search Process Variables

Findings on the search processes of users and professional intermediaries of bibliographic databases imply that users perform their self-searching in a rather simple and straightforward manner compared to exhaustive approaches taken by professional intermediaries. However, the higher interactivity that characterizes users' search process, particularly for fulltext databases, seems to imply different approaches taken by users and professional intermediaries.

Though the literature suggests some differences between search processes and tactics employed by users and professional intermediaries, these findings do not necessarily reflect the systematic superiority of either users or professional intermediaries. Rather, the source of difference seems to be knowledge, experience, training and individual differences of searchers. Thus, these search process variables seem not very useful in explaining users' preferences of a particular mode of *IR interaction*. However, since professional intermediaries perform rather exhaustive searches with multiple approaches for unfamiliar topics, users may make requests of professional intermediaries when they need a comprehensive search and/or search particularly in a domain external to their expertise.

On the other hand, variability in approaches found among users and information professionals is quite impressive. The literature implies that sources of such variability may include individual differences and situational variables such as searchers' knowledge and skills.

TASKS OF PROFESSIONAL INTERMEDIARIES IN IR INTERACTION

Even though numerous studies have examined the process of user self-searching and searching performed by professional intermediaries for users, little has been known empirically about what kinds of functions are actually performed by professional intermediaries as seen by users. Lack of empirical research based on a user perspective is at least partially due to the fact that LIS research has been focusing on the characteristics of intermediaries in human intermediation to discover "the qualities of the good professional intermediary" in order to use them as the model for designing expert systems (Spink, 1997b, p. 275).

Tasks Requested of Intermediaries by Self-Searchers

A great deal of LIS literature insists on the importance of user training in IR interaction (Janke, 1984; Mischo & Lee, 1987; Cole & Bawden, 1996). In fact, many authors suggest the shift of the role of librarians from intermediation to user training and intervention in user self-searching (Dalymple & Rodderer, 1994). In spite of the high enthusiasm and wide acceptance of self-searching in academic environments in the 1980s, many researchers reported that users often require the extensive assistance of librarians even after attending training sessions. Typical kinds of help requested by users in self-searching of bibliographic databases reported are:

- Search strategy formulation (Kirby & Miller, 1986; Penhale & Emard, 1986; Poisson, 1986; Friend, 1985),
- Use of Boolean logic (Poisson, 1986; Borgman, 1986; Friend, 1985; Leipzi, et al., 1983; Mader & Park, 1985; Slingluff, et al., 1985; Trzebiatowski, 1984; Janke, 1984),
- Use of search commands (Sewell & Teitelbaum, 1986),
- Selection, combination and modification of search terms (Mischo & Lee, 1987), and
- Technical problems such as computer use particularly in network connection and printing (Janke, 1984; Friend, 1985; Mischo & Lee, 1987).

On the other hand, infrequent users of online bibliographic databases in non-academic environments are found to have difficulty in using controlled vocabulary (Walton & Dedert, 1983), remembering special features of each database and finding appropriate search terms (Vollaro & Hawkins, 1986).

Even though fulltext, numeric, and visual databases are increasingly available for self-searching, little is reported in the literature on user training and characteristics of help required in searching these databases. However, it is not clear whether it is because professional intermediaries are not involved in self-searching of these databases as suggested by Dalrymple & Roderer (1994).

Tasks Performed by Professional Intermediaries in Human Intermediation

Textbooks of online searching aimed at librarians and professional intermediaries usually include extensive lists of tasks in sequence that are recommended to be followed to perform successful *IR interaction* in human intermediation (Walker & Janes, 1993; Lee, 1989). Some authors present these activities in the form of flow-charts. However, these lists or flowcharts tend to be rather prescriptive, idealizing the search process for teaching or facilitating searches. Therefore, they may not adequately describe what is actually performed by professional intermediaries (Bates, 1981). An exception is the following list presented by Fidel & Soegel (1983, p. 169) as a part of an exhaustive taxonomy of factors affecting online bibliographic retrieval based on a review of empirical literature.

1 Query formulation
2 Selection of search system(s) and database(s)
3 Interaction with the search system(s) and database(s)
4 Termination of the search and final set
5 Post-logoff activities

There are three possible limitations to the above list of tasks performed by users and/or intermediaries as a basis for a user perspective taken in the context of this study. First, the above list represents tasks in bibliographic *IR interaction*. By contrast, this study covers not only IR systems with bibliographic databases but also with fulltext, numeric and graphic ones. Second, the above list is based on empirical studies of human intermediation by professional intermediaries. But this study focuses not on tasks actually performed by intermediaries but rather those requested by users of human intermediaries. Third, the above list may reflect professional intermediaries' perspectives rather than users', because empirical studies that have been examined in developing the list are search processes of librarians. Thus, the process is seen entirely from intermediaries' viewpoints. By contrast, this study attempted to see human intermediation from users' viewpoint. Hence the same process of *IR interaction* in human intermediation may induce different connotations and meanings for users and intermediaries. Within that limitation, empirical research on human intermediation informs the following characteristics of tasks performed by intermediaries.

Clarification and Diagnosis of Users' Information Needs

In the LIS literature, professional intermediaries are generally assumed to be trained individuals who search online databases quickly and efficiently. They have extensive knowledge and experience to conduct interviews in order to elicit information needed by users and to focus the scope of the search (Dalrymple & Roderer, 1994), but do not have good domain knowledge of the topic of the search (Saracevic, et al., 1988; O'Day &

Jeffries, 1993b; Spink, 1997b). Thus the role of professional intermediaries is to use their knowledge and competence of the IR system "to provide clarifying and diagnostic aspects" (Spink & Saracevic, 1997, p. 745).

Selection of Controlled Vocabulary and Tactics

Based on a series of analyses of 40 naturalistically occurring mediated DIALOG search processes in an academic library, Spink (1997b) identifies five kinds of mutually exclusive interactive feedback components that make up the IR process. They are: (1) content relevance feedback (CRF); (2) term relevance feedback (TRF); (3) magnitude feedback (MF); (4) tactical review feedback (TCF), and (5) terminological review feedback (TMF). Spink found that content relevance feedback (CRF) in which the IR system output is reviewed to reformulate the query was primarily initiated by users. On the other hand, term relevance feedback (TRF) in which new search terms are selected based on IR system output, as well as magnitude feedback (MF) in which size of the IR system output is modified, were mostly initiated by intermediaries. Tactic review feedback (TCF) in which display of previous search strategy is used to generate the subsequent query, and terminological review feedback (TMR) in which display of index terms is used to generate the subsequent query, were always initiated by intermediaries.

Using the same data, Spink & Saracevic (1997) classified sources of terms used in retrieval into five mutually exclusive categories in order to identify the source of the terms that retrieved items judged relevant by users. They are: question statement (QS); user interaction (UI); thesaurus (TH); intermediary (IN); and term relevance feedback (TRF). Through the analysis they found that two classes of user generated terms, question statement (QS) and user interaction (UI), shared the majority (61%) of total of 593 terms. These results imply that information professionals perform tasks of selecting a controlled vocabulary and narrowing down search results to a manageable size.

Lack of Research on Post-logoff Activities

No empirical literature examined for this review focuses on post-logoff activities performed by information professionals. On the other hand, O'Day and Jeffries (1993b) found that regular clients of online search services in corporate libraries perform extensive post-processing of search results in order to share information with others. Thus, these users might act as intermediaries for other people.

Lack of empirical research on post-search information processing done by information professionals may be due to the fact that most of the studies of human intermediation in naturally occurring IPS involves academic librarians as intermediaries. Because academic librarians are generalists rather than domain experts in terms of the topic of search, they may be reluctant to make relevance judgments or to perform extensive analysis and/or editing of search results. Different from academic librarians, professional intermediaries in special libraries, as well as electronic gatekeepers emerged among users as the results of user training, may have better domain knowledge on the topic of the search. They may have better understanding of users' information

needs reflecting close proximity of their working relationship with users. Thus, users may expect these non-professional intermediaries to perform a wider scope of post-search information processing tasks, including reading, evaluating and synthesizing search results as a part of post-logoff activities, particularly for fulltext and numeric databases.

Conclusion on Tasks Performed by Intermediaries in IR Interaction

This section identified the major types of tasks requested of librarians by users in performing self-searching based on observations made by professional intermediaries, and found the major contributions of users in mediated searching to be the selection of terms and relevance judgment. Also, it presented a list of tasks performed by professional intermediaries in mediated searching developed through a review of empirical research.

On the other hand, major contributions of professional intermediaries are identified as initial development and subsequent modification of search strategy as well as controlling of the magnitude of output within a manageable size. However, tasks in post-logoff activities as being performed by information professionals are not reported probably because empirical research is lacking on this aspect.

CHARACTERISTICS OF SELF-SEARCHERS AND THOSE WHO USE HUMAN INTERMEDIATION

The introduction of user training programs for online bibliographic IR systems in the 1980s resulted in a high level of interest in and acceptance of self-searching in academic environments, particularly among students (Mischo & Lee, 1987). On the other hand, user training in non-academic environments leads to rather disappointing results with more than a 50% dropout rate (Richardson, 1981; Haines, 1982; Walton & Dedert, 1983; Nicholas, et al., 1986; Harman, 1986). It seems as if there is a difference in acceptance by users of self-searching between academic and non-academic environments.

Table 2-2 shows characteristics of users who perform self-searching and those who use human intermediation based on the literature. These characteristics include both situational factors and individual differences and are categorized into several dimensions. Reflecting the difference observed between academic and non-academic environments, characteristics peculiar to users in academic environments are shown with one asterisk (*) while characteristics of users in non-academic environments are shown with two asterisks (**). Each dimension of the user characteristics is discussed further in the following section.

Table 2-2: Characteristics of Self-Searchers and Those Who Use Human Intermediation (1/2)

Dimensions	Self-Searchers	Users of Human Intermediation
1. Motivation	**Enthusiastic about self-searching** (Case, et al., 1986; Kirk, 1986; Bell & Halperin, 1989; Dalrymple, 1990) **Satisfied with self-searching** (Barber, et al., 1973; Hsu, 1991) **Perceive self-sufficient** (Hart & Rice, 1991; Ikeda & Schwartz, 1992) **Ambivalent about attending training sessions** (Mischo & Lee, 1987; Nicholas, et al., 1986; Kirby & Miller, 1986)	**Unwilling to learn search skills** (Nicholas, et al., 1986; Vollaro & Hawkins, 1986) **Satisfied with human intermediation** (Richardson, 1981; Vollaro & Hawkins, 1986) ****Have frustration of desire to read fulltext** (Richardson, 1981; Arnold, 1982)
2. Economic considerations	**Cost-conscious** (Richardson, 1981; Bodtke-Roberts, 1983; Bell & Halperin, 1989; Nicholas, et al., 1986; Haynes, et al., 1991)	**Cost-conscious** (Nicholas, et al. 1986; Sandore, 1990; Nicholas, 1995) **Do not want to spend their own time** (Cornick, 1989; Sandore, 1990) ****Other responsibilities demand their time** (Richardson, 1981; Walton & Dedert, 1983; Harman, 1986)
3. Knowledge and skills	**Familiar with computers** (Kirk, 1986; Hart & Rice, 1991; Ikeda & Schwartz, 1992) **Regular searchers** (Hart & Rice, 1991; Ikeda & Schwartz, 1992) ***Familiar with OPACs and printed indexing tools** (Mischo & Lee, 1987; Dalrymple & Roderer, 1994) ****Domain experts** (Nicholas, 1995; Cole & Bawden, 1996)	**Unfamiliar with search systems** (Hsu, 1991) **Lacking search skills** (Hurt, 1983; Cornick, 1989; Hsu, 1991; Nicholas & Martin, 1993) **Infrequent searchers** (Richardson, 1981; Walton & Dedert, 1983; Nicholas, et al., 1986; Bell & Halperin, 1989; Ikeda & Schwartz, 1992) **Forgotten how to perform a search** (Richardson, 1981; Walton & Dedert, 1983; Harman, 1986; Vollaro & Hawkins, 1986; Nicholas & Martin, 1993; Smith, 1993) ****Cannot type** (Richardson, 1981; Arnold, 1982) ****Searching in an unfamiliar domain** (Haines, 1982; Nicholas, 1995)
4. Role and status of users	**Electronic gatekeepers** (Richardson, 1981; Bodtke-Roberts, 1983; Nicholas, et al., 1986; Mischo & Lee, 1987; Cole & Bawden, 1996) ***Mostly graduate students** (Janke, 1984; Crooks, 1985)	***Mostly graduate students** (Cornick, 1989)
5. Experience of using human intermediation	***Have little or no experience of using human intermediation** (Poisson, 1986; Mischo & Lee, 1987)	***Have some experience of using human intermediation** (Cornick, 1989)
6. Nature of information need/use	**Plan to download the results for post-processing** (Hart & Rice, 1991; Ikeda & Schwartz, 1992) ****Have focused and practical information needs** (Dalrymple, 1990) ****Cannot or unwilling to explain their information needs** (Haines, 1982; Vollaro & Hawkins, 1986; Nicholas, 1995)	
7. Type of database used	**Use fulltext or numeric databases** (Eckersley & Rennie, 1984; Dalrymple & Roderer, 1994)	
8. Accessibility	****Physically remote from professional intermediaries** (Vollaro & Hawkins, 1986; Nicholas & Martin, 1993; Nicholas, 1995) ****Have direct access to IR systems from own office or home** (Vollaro & Hawkins, 1986; Lindberg, et al., 1993)	****Have no access to IR systems from their own office** (Vollaro & Hawkins, 1986; Nicholas & Martin, 1993; Nicholas, 1995)
9. Individual difference		**** Females tend to delegate more than males** (Nicholas & Martin, 1993)
10. Other situationality		****Searching in an unfamiliar domain** (Haines, 1982; Nicholas, 1995)

* findings only in academic environments ** only in non-academic environments

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Dimensions of User Characteristics

In the following, each dimension of the user characteristics (situations and individual differences), as categorized in Table 2-2, is discussed with relevant models and findings.

Motivation

Users who conduct self-searching are characterized as enthusiastic about self-searching from the beginning and satisfied with self-searching regardless of outcome. They perceive themselves as self-sufficient and feel ambivalent about attending training sessions. These characteristics may not only be common characteristics of most self-searchers, but also imply that only those users who are highly motivated in self-searching volunteer to participate in surveys or quasi-experiments, two of the most frequently employed research methods in studying user self-searching. Even though they are motivated in conducting self-searching, small-scale case studies indicate that they are not willing to devote much time to learn how to use IR systems by attending formal training, but prefer one-to-one methods at the time when they have real search need, (Nicholas, et al.1986; Nicholas & Martin, 1993; Borgman, 1996). In fact, Hsu (1991) reports that more than 40% of faculty MEDLINE users at a medical college learned to perform self-searching by themselves.

By contrast, users who make requests of intermediaries are not only unwilling to attend training sessions but also *unwilling to learn search skills*. They are *satisfied with the use of human intermediation*.

Some users seem to delegate their search to professional intermediaries in expectation of obtaining evaluated and synthesized information, because they *have frustration of desire to read fulltext*. It sounds as if some users just don't want to read fulltext documents. For example, engineers in an industrial environment who are looking for solutions to their technical problems tend to delegate. Richardson (1981) proposes that the common wisdom in library and information science is "engineers [do] not read" (p. 49). Similarly, managers who are looking for information required in making strategic decisions tend to prefer to delegate searching (Arnold, 1982), because they want to receive digests or ideas rather than documents or references as the outcome of searches (Hall, 1977; Hall, 1981). Nicholas (1995) reports as one of the reasons for a member of the House of Commons in England he interviewed, not using in-house IR systems or services directly because of the frustration with anticipated massive output from online searching. This is because direct searching or even mediated searching leads them to the desire to read fulltext of the document. Thus, Arnold (1982) proposes information professionals be "able to add value to search results by summarizing and reporting" (p. 80) in helping managers using databases.

Economic Considerations

Users who perform self-searching are highly *cost-conscious*. This is particularly important among academic users usually charged for self-searching or mediated searching of commercial online services. Thus they shifted from mediated searching of commercial online databases to self-searching of locally mounted databases and

CD-ROM databases when they are available free of charge. Even in industrial environments in which users are not directly charged for their search, some of them are reported to be *cost-conscious* (Richardson, 1981; Nicholas, et al., 1986; Haynes, et al., 1991). On the other hand, Crea, et al. (1992) claim that the majority of direct-searchers of MEDLINE users (faculty, researchers and medical staff) at an academic medical library are not very *cost-conscious*, because they do not remember how much they pay for their self-searching of online MEDLINE.

Some users who use human intermediation are also found to be *cost-conscious*. Different from professional intermediaries, users tend to begin their search without sufficient preparation (Janke, 1984), but rather browse extensively while searching (Fenichel, 1981; Haines, 1982; Nicholas, 1995). Thus, an average search session in commercial online IR systems may take a longer period of time for self-searching than for human intermediation and, therefore, be more costly in terms of both online connection costs and users' time costs (Mischo & Lee, 1987). Therefore, users who do not want to spend their own time may delegate the search to information professionals. This is particularly true for users who think online searching is not their job and that other responsibilities demand their time. These users indicate that they want to use their time more efficiently than conducting self-searching (Richardson, 1981; Walton & Dedert, 1983; Harman, 1986).

Knowledge and Skills

Borgman (1996) argues that traditional query-based IR systems, such as OPACs and bibliographic IR systems, are "designed for expert librarian searchers who have a rich conceptual framework for information retrieval..." Most users lack the required "conceptual knowledge for searching" (p. 501). Borgman claims that three kinds of knowledge are required for traditional query-based IR systems. They are:

- Conceptual knowledge of the information retrieval process – translating an information need into a searchable query;
- Semantic knowledge of how to implement a query in a given system – how and when to use system features;
- Technical skills in executing the query – basic computer skills and the syntax of executing queries as specific search statements (p. 496).

The literature suggests that users who perform direct searching tend to have some of the above knowledge or skills. They are *familiar with computers* and/or *familiar with OPACs and printed indexing tools*. Because they are *regular searchers*, they can keep up with their search skills. On the other hand, users who use human intermediation are *unfamiliar with search systems* and/or *lacking search skills*. They may have learned how to do searches by attending training sessions or through observing intermediaries in mediated searching. But they have *forgotten how to perform a search* due to the fact that they are *infrequent searchers*.

Social learning theory suggests that individuals lacking component sub-skills may be unable to reproduce observed behavior (Weiss, 1990). A relatively old case study of user training in an industrial environment reports that one attendee of the training gave up direct searching because he *cannot type* (Richardson, 1981). Similarly, Arnold (1982) claims that one of the reasons corporate managers delegate searches is because they "don't know how to type and won't learn" (p. 78). Though today's increased demand for using computers in educational and work environments may mean more people can now type, the above example illustrates the importance of component sub-skills in performing self-searching.

Users who perform self-searching are *domain experts* of the topic on the search. Traditionally, users of human intermediation were considered as having better domain knowledge of the topic of the search (Lancaster, 1969; Barber, et al., 1973; Richardson, 1981; Bodtke-Roberts, 1983; Saracevic, et al., 1988; O'Day & Jeffries, 1993a; 1993b; Spink, 1997b). But the literature suggests that some users make requests of human intermediaries only when they are *searching in unfamiliar domains* (Haines, 1982; Nicholas, 1995). Thus, the association between the level of domain knowledge held by users and generation of either mode of *IR interaction* remains controversial.

Both domain knowledge and knowledge of information need play significant roles in relevance judgment (Cuadra & Katter, 1967; Rees & Schultz, 1967; Lancaster, 1969; Schamber, et al., 1990; Spink, 1997b) and post-search information processing (Richardson, 1981; O'Day & Jeffries, 1993a, 1993b). A user who has generated an information need, by definition, is in a better position than anyone else to make a relevance judgment regardless of whether he has extensive domain knowledge or not (Lancaster, et al., 1994). But, if s/he has good domain knowledge of the topic of search, then s/he should be able to gain the best outcome by directly examining the search results. On the other hand, professional intermediaries who lack extensive domain knowledge tend to prefer users to stay with them during IR sessions (Richardson, 1981; Sandore, 1990; Spink, 1997b) probably because they can rely on users' domain knowledge and ability to make relevance judgments.

Role and Status of Users

The literature of user training reports the emergence of *electronic gatekeepers* among users who perform IR session on behalf of other users either voluntarily or by assignment. However, no empirical studies examined focused on the actual search process performed by non-professional intermediaries or reasons for people to make search requests of these electronic gatekeepers.

Early studies of user of self-searching and human intermediation in academic environments are *mostly graduate students*. Large-scale surveys of attendants of user training sessions and patrons of mediated online search services found that the majority of users are graduate students. In addition, the majority of volunteers participating in quasi-experiments comparing self-searching with human intermediation in academic environments are also graduate students. However, participants in recent observational studies of naturalistically

occurring user self-searching processes represent both undergraduate and graduate students equally. Since it is quite reasonable to assume that the majority of users of academic libraries are students, these characteristics may simply reflect the general configuration of user population in academic environments.

On the other hand, faculty and staff who generate either or both self-searching and human intermediation are under-represented in empirical studies of academic environments. However, it is not clear whether this is because they don't attend training sessions and tend to access IR systems from their own offices rather than in libraries where observational studies are conducted or because they do not use IR system often to locate information due to the fact that they have developed other ways of getting necessary information, as suggested by Ellis (1989a, 1989b). It might be the case that they do not perform self-searching by themselves but ask non-professional intermediaries such as graduate assistants or secretaries to do it for them. Even though Mischo and Lee (1987) report that some graduate students are acting as intermediaries for research projects with faculty members, no study examined for this literature review inquires into faculty use of graduate students as intermediaries in *IR interaction.*

Experience of Using Human Intermediation

The literature reports that users of self-searching in academic environments *have little or no experience of using human intermediation.* On the other hand, users who generate human intermediation *have some experience of either self-searching or mediated searching.* These findings implicitly suggest that different populations of users select different modes of *IR interaction.* However, some empirical evidence suggests that the same user generates both self-searching and human intermediation (Haines, 1982; Veenstra, 1992; Crea, et al., 1992; Dalrymple & Roderer, 1994; Nicholas, 1995).

Nature of Information Needs and Use Orientation

Different types or levels of information needs may be associated with the choice between self-searching and human intermediation. Dalrymple (1990) reports that users who conduct self-searching *have more focused and practical information needs* than those who use human intermediation. On the other hand, users perform self-searching because they *cannot or are unwilling to explain their information needs.* For example, faculty members in biology observed and interviewed by Bodtke-Roberts (1983) prefer direct searching of BIOSIS because they do not need to explain to someone not in the field (i.e., a librarian) about their research and their information needs. Nicholas (1995) reports that some political staff at the UK Parliament prefer self-searching for politically biased information needs and that some journalists tend to perform self-searching for idea-generating information needs. Salovaara (1988) found that some "rather superficial information needs" were never asked to be fulfilled by professional intermediaries (p. 109). Also, users tend to perform self-searching when they *plan to download the results for post-processing.*

Type of Database Used

Users who use *fulltext or numeric databases* tend to perform self-searching. Fulltext databases of commercial online services aimed at the legal professionals, such as LEXIS and WESTLAW, have been searched directly by users in the legal community especially after the introduction of natural-language search interfaces (Dalrymple & Roderer, 1994). Similarly, econometric databases have been directly searched by industrial economists, who are acting as intermediaries and are delegated the access and manipulation of data by their superiors (McKersley & Rannie, 1984). Cole & Bawden (1996) also found that free or inexpensive factual data in the field of pharmaceutical research such as GenBank and EMB on the Internet have been widely searched directly by industrial users.

Several reasons may explain the popularity of direct searching of fulltext and numeric databases among users. First, these databases are less structured compared to bibliographic ones. Therefore they do not require sophisticated search skills or use of controlled vocabularies. Second, fulltext and numeric databases provide raw data rather than meta-data. Thus direct-searchers can obtain and use information quickly by reading, evaluating, extracting and processing interim search results while interacting with the IR system. This is because real-time processing of interim search results requires domain knowledge as well as knowledge of the information need and/or planned use. Users have an advantage over professional intermediaries who tend not to have either domain knowledge or knowledge of information needs. However, whether users rely on non-professional intermediaries in searching fulltext databases is unknown.

Accessibility

Self-searchers in non-academic environments tend to be *physically remote from professional intermediaries*, but *have direct access to IR systems from their own office or home*. By contrast, those users who generate human intermediation *have no access to an IR system from their own office*. These characteristics are explained by the well known "least effort principle" suggesting that people prefer more accessible and convenient information sources and tend to spend the least effort possible in completing their IPS tasks (Poole, 1985).

Individual Difference

Nicholas & Martin (1993) suggest that gender makes a difference. He reports that *female journalists tend to delegate more than male* counterparts. However, he does not offer any explanation for the difference. Nicholas (1995) reports that older journalists tend to perform direct searching more effectively than younger ones. He attributes the success of older journalists to their longer job experience.

Situationality

Some of the characteristics presented above suggest that different groups of users select either self-searching or human intermediation consistently. However, the literature reports that the same users generate both self-

searching and human intermediation depending upon the situation (Haines, 1982; Veenstra, 1992; Crea, et al., 1992; Dalrymple & Roderer, 1994; Nicholas, 1995).

Haines (1982) reports reasons for self-searchers to occasionally use human intermediation such as *for searching in an unfamiliar domain and for more complex and difficult searches*. Similarly, Nicholas and Martin (1993) report that journalists tend to perform straightforward searches by themselves and use human intermediation for difficult searches.

One of the situational factors that may determine users' selection of a search mode is their search stage in the IPS process. Crea, et al. (1992) suggest that users in academic medical libraries make search requests of information professionals or ask colleagues and/or staff to search for them if they cannot find needed information through self-searching. Similarly, Sandore (1990) reports that academic users of the fee-based online search service of a public library tend to make requests of human intermediaries after they have attempted to locate information by themselves. By contrast, business users in Sandore's research have seldom made any prior efforts to locate information by themselves. She attributes the difference to cost and time factors – academic users who pay for the search by themselves opt to save money, while business users whose company pays for the search tend to appreciate saving their time.

The multiple search session model proposed by Saracevic, et al. (1991), and replicated by Spink (1993) suggests that users generate multiple search sessions within their single IPS process. Kuhlthau, et al. (1992) try to capture the evolving nature of multiple sessions within Kuhlthau's model of *information search process (ISP)*. They advocate that the results of previous *IR interaction* may alter the original information needs, generating a successive chain of *IR interactions* in an IPS process. Existing studies of multiple sessions have captured the occurrence of either multiple self-searchings or multiple human intermediations within an IPS process. But multiple sessions involving both self-searching and human intermediation may occur within an IPS process if users' information needs evolve through repeated IR interaction. Applying Taylor's (1968) model of *question negotiation process*, a user may conduct self-searching first, ask help or make a search request of colleague and/or subordinate second, and make a search request of the professional intermediary (librarian) last.

Conclusions Concerning User Characteristics

Research findings concerning user characteristics of the human intermediation are contradictory. The literature implies that the selection between self-searching and human intermediation is a product of a variety of factors. Factors identified include both personal and social/environmental aspects. They are: the user's motivation; economic (time and money) considerations; experience of different modes of IR interaction; accessibility to IR systems and/or human intermediaries; skills and knowledge of the user and the intermediary; the status of and relationship between the user and the intermediary; types and number of databases used; and individual differences of the user such as gender, age and job experience. For users in the environment in which ready

access to both IR systems and human intermediaries is available, the selection seems to be associated not only with the internal state of cognition and affection (e.g., knowledge, skills, feeling, nature of information need and information use orientation, the results of previous searches in the same IPS process, etc.) but also external conditions (e.g., accessibility of IR systems and human intermediaries, users' status and interpersonal relationships with intermediaries and other people in the environment, etc.).

CONCLUSION ON FINDINGS OF RESEARCH IN HUMAN INTERMEDIATION

The existing literature on human intermediation is limited because it tends to represent the perspective of professional intermediaries. In addition, existing research in human intermediation is concentrated on the use of bibliographic databases, while other types of databases such as fulltext, graphic and numeric ones are neglected. Under such limitations, the literature establishes the following:

- Search process variables of users and professional intermediaries, such as efforts spent on preparation and the level of interactivity, do not necessarily reflect superiority of either users or professional intermediaries. Rather, they seem to reflect a variety of situational variables such as level of knowledge and experience as well as individual difference variables.
- The literature provides some description of tasks performed by professional intermediaries in mediated searching in which the users are present during search sessions (Fidel, 1981; Saracevic, et al., 1991; Spink & Saracevic, 1997). The literature also provides some description of what is going on in users' minds in self-searching of bibliographic and fulltext databases (Marchionini 1995; Hert, 1995). However, the literature informs very little on what is done by intermediaries in the way on post-logoff activities.
- The literature reveals some characteristics of users who use human intermediation. Some of these characteristics, such as motivational and other individual differences, may suggest that human intermediation is constantly used by particular users. On the other hand, the literature informs us that a variety of situational variables are associated with the use of human intermediation. Some of these situational variables, such as the nature of the information need and information use orientation, knowledge, and stage of the IPS process (results of the previous search) may reflect users' internal states. Others, such as the role of users in IPS, economic considerations of time and money, as well as accessibility to IR systems and/or professional intermediaries, seem to reflect social and environmental situations as well. In addition, literature reports that the same user conducts self-searching and uses human intermediaries depending upon the situation (Nicholas, 1995).

The lack of research on tasks requested of human intermediaries, particularly of post-search information processing, confirms the necessity to answer the first research question (*what kind of tasks do users request of human intermediaries?*) in order to establish the distinction among tasks users requests of human intermediaries.

Findings on characteristics of users who generate human intermediation imply the importance of situational factors. These findings suggest that the situational factors may reflect users' internal states as well as social and environmental settings. However, the literature does not provide a good understanding of the association between these factors and the users' decisions of using human intermediation, but rather contradictory findings. Moreover, these findings tend to be the by-products of studies focused on other aspects of IR or IPS behavior. No literature reviewed has focused on factors associated with the use of human intermediation. Therefore, the second research question asked in this research is unique and important. If distinction can be made among different tasks requested of human intermediaries, there may be patterns between situations of users and tasks they request. Thus, the third research question is meaningful.

CHAPTER CONCLUSION

The intention of this chapter was to review the topics in IR and IPS research considered relevant for the study. The aims of the literature review in this chapter were:

- To justify the choice of research topic,
- To define key concepts, and
- To identify findings and models relevant to this study.

The result was synthesized as follows:

Empirical evidence was provided that some users are still relying on human intermediaries in carrying out their IR tasks even though they have direct access to IR systems. But the literature did not provide sufficient empirical evidence to clarify what tasks are expected of intermediaries in human intermediation, or, why and in what situation users rely on intermediaries.

Key concepts are defined with their relationships in order to establish the focus of and the viewpoint taken by the study. IR systems were defined broadly to capture the recent growth and diversification of electronic environments. Human intermediation was defined as a particular activity encompassed in an IPS process in order to capture the context. A distinction was made on the role of users in IPS process, in order to take into consideration the situational dynamics of human information behavior.

Major assumptions central to this study were identified and justified. They are:

- Users may request a variety of tasks to human intermediaries in carrying out their IPS processes for a variety of reasons not limited to their internal (cognitive and affective) but also including external (social and environmental) conditions.
- For human intermediation to be seen as an activity encompassed within an IPS process, further examination of the information use component is necessary. The function of information analysis, required to produce evaluated information to the point of use, seems to be the key.
- Users actively make choices, consciously or unconsciously, in selecting between self-searching and human intermediation. Thus, the major determinants in the selection are perception of internal and external situations and intentions of users.

Human IPS behavior is complex, particularly when involving other people such as intermediaries. Despite the massive literature of models and findings in IR and IPS research, the field has not yet achieved an adequate understanding of how the human mind works in generating and carrying out IR and IPS processes (Taylor, 1986). Besides, this research uniquely defined key concepts to emphasize the perception and intention of users. Thus, this study should be seen as an initial attempt to inquire into a new area of research, rather than a mere extension of existing studies conducted around human intermediation.

Such recognition guided this research to take an exploratory approach. At the same time, this research used existing models and findings as guides for research design and data collection in order to take advantage of the cumulative nature of scientific research.

CHAPTER THREE

SEARCH FOR THE OPTIMAL APPROACH

This chapter reviews the assumptions and the approach in conventional IR and IPS research in order to identify and justify the most appropriate approach for this study. Because of the complexity of human intermediation in IPS processes that involve multiple actors (i.e., users, intermediaries, and IR systems), this phenomenon could be approached from a variety of perspectives. The approach selected for this study takes users' perspective and focuses on the use of human intermediation as a particular activity encompassed in an IPS process. Thus, this research posits human intermediation in the broader context of information need, as well as information use as seen by the users.

First, the assumptions underlying this study are presented. Second, different approaches in library and information science (LIS) concerning IPS and IR research are examined. Finally, a preliminary framework developed for the purpose of this study based on the literature will be presented.

ASSUMPTIONS OF THIS STUDY

Despite a great deal of literature on IR and IPS research, it does not provide sufficient understanding of human IPS behavior in general and human intermediation in particular. Based on the review of literature concerning human intermediation (Chapter 2), potential sources of such limitations are:

- The lack of distinction among different types of tasks requested of and performed by human intermediaries in human intermediation,
- The lack of research integrating IR and IPS processes, particularly in the use of human intermediation,
- The lack of empirical research that captures human intermediation from users' perspectives.

In order to overcome the above limitations, this research makes the following assumptions:

- The tasks requested of human intermediation may correspond to tasks presented in IPS process models.
- Use of human intermediation is a particular activity encompassed in the broader context of IPS processes.
- Users actively make choices, consciously or unconsciously, in selecting between self-searching and human intermediation in response to their personal (internal) and social/environmental (external) situations – they behave differently according to their perception of themselves as well as of their environments. Thus, the examination of both internal and external situations, as perceived by users, relevant to the context of the IR interaction is necessary.

The above assumptions are bases for selecting an appropriate approach for this research.

Table 3-1: Implicit Assumptions of System-Centered and User-Centered Perspective*

	System-Centered Perspective	User-Centered Perspective
Information	Objective entity such as channels (e.g., oral, written, formal, informal. Etc.) or sources (e.g., library, book, index, people, database, etc.) with which the user interacts.	Subjective construct that may change the structure of user's knowledge. It is the actual meaning constructed by the receiver from the message.
User	A person who puts a demand or makes use of information channels or sources, and is describable in terms of demographic variables without taking into account the context of use.	An active processor of information; a purposive, self-controlling, and sense-making being in a particular time and space.
Information need	When the user uses a source or channel, that behavior is interpreted as an information need. Thus, it is manifested within the limit of what channels or sources are available to the user;	That which induces information-seeking behavior. It may reflect physical, cognitive, social and/or affective needs.
Information use	The access to channels or sources; substantive content extracted from the channel or sources and the ends served by it are outside the scope.	The end served by information, the meaning constructed by the receiver from the content of messages received by the user which changes the structure of his knowledge: e.g., ideas generated, decisions made, actions taken, etc.
Information behavior	Focuses on externally observable behavior of users' interaction with systems across situations.	Focused on the internal and/or social interaction beyond interaction with systems to include the points where use and effects occur; emphasize situationality of information behavior.

* Developed based mainly on Dervin & Nilan (1986), Taylor (1986), Savolainen (1993), Wilson (1981; 1997), Ellis (1989a, 1989b) and Sugar (1995).

TWO PERSPECTIVES IN IR AND IPS RESEARCH

Two sets of contrasting perspectives co-exist in the research tradition of LIS: (1) the system-centered perspective which emphasizes the needs of systems, and; (2) the user-centered perspective which emphasizes the needs of users. Nevertheless, both perspectives ultimately seek to develop optimal information systems and/or services that respond to users' needs.

Each of the two perspectives implicitly makes different assumptions for central concepts of IPS and IR, including information, user, information need, information use, and information behavior. Though assumptions made by different approaches in each of the two perspectives vary slightly, the general assumptions of the two perspectives may be synthesized as presented in Table 3-1.

In short, the system-centered perspective posits users as passive receivers of objective information such as channels or sources and their interaction with the IR system as an input-output process, hence focusing on capturing observable information behavior across situations. The user-centered perspective, on the other hand, assumes users as active processors of information who construct meaning through their social and/or personal interaction beyond the limitations of particular information systems and emphasizes the situationality of human information behavior. Since this study assumes active users who make the choice between self-searching and human intermediation depending upon internal and external situations, the user-centered perspective is the obvious choice.

The following section compares and contrasts three different approaches in the user-centered perspective, in the search for the optimal approach for this study.

DIFFERENT APPROACHES IN USER-CENTERED PERSPECTIVE

Several different approaches are observed in the user-centered perspective. Based on the synthesis of the literature, categorized roughly into three groups: (1) *cognitive approaches* that emphasize the knowledge structure and thinking process of users involved in IPS and IR process; (2) *constructive approaches* that emphasize both cognitive and affective dimensions of individual users; and (3) *social approaches* that emphasize social aspects and shared value among a group of users in addition to cognitive and affective states of individual users (Table 3-2). As may be found in the following, the three categories are neither mutually exclusive nor exhaustive.

The approach of this research requires: (1) to capture IPS as a process in which human intermediation is a part, (2) to cover cognitive as well as affective aspects of IPS behavior; and (3) to account for social/environmental aspects. The requirement of accountability for social/environmental aspects is particular to the second research question (*What situational factors do users perceive to be salient when they make requests of human intermediaries?*). However, before asking the second research question, answering to the first

Table 3-2: Approaches in User-Centered Perspective of IPS and IR Research

Approaches	Characteristics of the Approaches	Examples of Researchers/Models
Cognitive approaches	Emphasize the knowledge structure and thinking process of individual users. Attempt to explain both internal and external information behavior of a user in relation to what the user thinks and knows.	Static frameworks (Borgman, 1986; Allen, 1990; Jacobson, et al., 1993; Ford, et al., 1994) Dynamic frameworks (Oddy, 1977; Belkin, et al., 1982a, 1982b; Daniels, 1987; Ingwersen, 1992)
Constructive approaches	Emphasize both cognitive and affective dimensions of individual users. Attempt to explain internal and external information behavior of a user in relation to what the user thinks, knows and feels.	Sense-Making (Dervin, 1983; Dervin & Nilan, 1986; Newby, et al., 1991) Information Search Process (ISP) (Kuhlthau, 1992)
Social approaches	Emphasize both cognitive and affective dimensions shared among a particular group of users. Attempt to explain collective information behavior of a group of users in relation to their social interaction, environmental conditions and/or to share value among the group of users.	Value-Added Model (Taylor, 1986) Parameters of Value (Hall, 1977) Life in a Small World (Chatman, 1991) Behavioral Approach Taken by Sheffield School (Wilson, 1997; Wilson, 1990; Ellis, 1989a, 1989b) Social Informatics (Karamuftuoglu, 1998; Cool, 1997)

research question (*What kind of tasks do users request human intermediaries?*) is necessary due to the lack of distinction among tasks requested of human intermediaries. Since these two questions are asked in this study, the approach taken by the study should be consistent. Thus, this research requires taking an approach that is accountable for social/environmental aspects of human IPS behavior. Thus, the social approach seems to be the most appropriate choice for this study.

COGNITIVE APPROACHES

Insomuch as knowledge is concerned, the *cognitive approaches* assume that different users behave differently for their IPS under a similar situation because of their different cognitive structures developed through different past experiences. Hence, they may interpret the identical situation differently. Even though there has been an ongoing debate among researchers on whether the affective dimension should also be included, this study takes the position that the affective dimension is external to the cognitive approaches following Allen (1996).

Within the cognitive approaches, there are two alternative views concerning the stability of the user's information needs throughout IR interaction: the *static framework* and the *dynamic framework*. The *static framework* does not take into account changes that might occur in users' information problems during IR and IPS processes.

By contrast, those who adopt a *dynamic framework* explicitly account for the changing nature of information problems, particularly in response to the encounter with new information in IR interaction or the IPS process. Theoretical details and examples of research in each framework are extensively reviewed by Hert (Hert, 1995).

Static Framework

According to Hert (1995), one area of the static view of the cognitive approach focuses on individual differences. For example, Borgman (1989) proposes that academic orientation, technical aptitudes and other personality variables are related to IR performance. Allen (1990) demonstrates the relation between cognitive structure and selection of keywords. Jacobson, et al. (1993) shows that computer familiarity, knowledge of database and domain knowledge, when combined, are related to IR performance. Ford, et al. (1994) demonstrate the relation between users' learning styles and the search strategy they use. The efforts in this area, however, have not yet achieved sound theoretical explanations (Saracevic, 1991).

Dynamic Framework

On the other hand, researchers who take the *cognitive viewpoint* assume the dynamic nature of information needs and propose seeing *IR interaction* as a communication process. This receiver-oriented framework has been developed through the *anomalous state of knowledge (ASK) hypothesis*, which stresses the inability of users to describe their information needs accurately and completely (Belkin, et al., 1982a, 1982b). Researchers in this vein concentrate their efforts on the development of dynamic user models to be employed in IR system design (Belkin, et al., 1987; Daniels, 1987; Ingwersen, 1992)

Even though knowledge of users may be associated significantly with their selection between self-searching and human intermediation, either of the above cognitive approaches is too limiting for this study. The *static framework* does not explicitly admit the operation of situational factors in IR and IPS behavior, while the *dynamic framework* still takes little account of the affective dimension presumably linked to social aspects.

CONSTRUCTIVE APPROACHES

Researchers who take *constructive approaches* incorporate both cognitive and affective dimensions, but of individual users. They tend to see IPS behavior from users' personal constructs without explicitly taking into consideration social and environmental aspects that might be associated with users' IPS behavior. Two such approaches examined in the following are *sense-making* and *information search process (ISP)*.

Sense-Making Approach

Dervin and her colleagues (Dervin, 1983; Dervin & Nilan, 1986) have developed and implemented the *sense-making theory* with its unique methods of *time-line interview*. This theory relies heavily on the constructivist theory of discontinuity condition which prompts individuals to take steps to construct sense in ever-changing life situations (Dervin & Nilan, 1986). *Sense-making theory* regards IPS as communication behavior – both

internal and external – in which the individual user constructs and designs his movement thorough time/space by making sense out of the discontinuity. Thus, this approach is capable of capturing a variety of information behavior including information seeking, processing, creating and using (Savolainen, 1993). Also, this approach deals with the affective dimension as well as the cognitive dimension of the user's perception, particularly when it operates on the "situation movement state" – the main indicators to describe the triggering situation. It captures "the inverse relationship between the amount of anxiety the respondent feels at a particular point, and the amount of control s/he thinks s/he has" (Newby, et al., 1991, p. 75) over the situation.

However, this approach seems to be unable to account for the reciprocity of social action. Savolainen (1993) argues that the approach does not take into account explicitly the possibility that outcome of social action is tied to particular occasions and to other participants in the situation even though social conduct displays itself as contingent upon the conduct of others. Though this approach assumes the existence of patterns or regulations in how people approach IPS at a meta level, it tends to capture the situation as an internally constructed reality by a particular information seeker at a particular time. Such individualistic conceptualization of situationality limits the applicability of this approach to IR and IPS behavior in organizational environments in which social interaction may play an important role.

Methodologically, the *sense-making approach* seems to have another limitation for this study that intends to capture IR interaction encompassed within an IPS process. Namely, the sense-making methodology tends to capture a particular IPS behavior in a particular situation at a particular time – only when the user perceives a gap – the unit of analysis is on gap level. Therefore, the approach might be limited for this study that intends to capture IR and IPS as a process.

Information Search Process (ISP)

Kuhlthau (1985; 1988) empirically developed a model of *information search process (ISP)* of college-bound high-school seniors based on Kelly's (1963) *personal construction theory*. The theory proposes that people construct their world through the process of constant learning. The resulting *information search process (ISP) model* (Kuhlthau, 1992) incorporates behavioral, affective and cognitive aspects of constructive learning into the students IPS of six stages: (1) initiation, (2) selection, (3) exploration, (4) formulation, (5) collection, and (6) presentation. Throughout these stages, students' thoughts change from vague into focused with increasing interest, their action from seeking relevant information into seeking pertinent information, and their feeling from (1) uncertainty, (2) optimism, (3) confusion, frustration and doubt, (4) clarity, (5) sense of direction and confidence, into (6) satisfaction or disappointment. This model has been validated in a variety of educational settings (Kuhlthau, 1989; Swain, 1996).

This approach fulfills two of the three requirements of the study – it covers behavioral, cognitive as well as affective aspects of IPS process and it captures IPS as a process. However, development and validation of the

model is based mostly on empirical research in educational settings in which the focus is to help students learn IPS skills in order to make them self-help information processors. The purpose of IPS in work situations, the context included in this study, is not necessarily to help users learn IPS skills but rather to help them solve their information problems with optimal efficiency and effectiveness (White, 1992). In addition, Kuhlthau's (1992) *ISP model* is based on a rather individualistic view and is therefore unable to account for social aspects of IPS behavior. Thus, even though the approach itself seems rigorous, the theory Kuhlthau based it on as well as the resulting model of *ISP* seems too limiting for this study.

SOCIAL APPROACHES

Several researchers emphasize the social and environmental aspects, in addition to personal aspects, in determining the IPS behavior of users. Researchers who take *shared-value approaches* emphasize the impact of values and norms shared among a group of people on their IPS behavior. Such emphasis is also common among researchers of the Sheffield school who take so-called *user-based behavioral approaches.*

Shared Value Approach

This approach focuses on the perception of utility or value brought by a group of users to information sources, systems and services. Researchers who take this approach assume the existence of shared values in evaluating information or information systems/services. They also admit the operation of shared norms among a group of people in determining the appropriateness of their information behavior. Several different versions are observed including the *value-added model* (Taylor, 1991; 1986; MacMullin & Taylor, 1984), *parameters of value* (Hall, 1977; 1981), and *life in a "smallworld"* (Chatman, 1991; 1996).

Value-Added Model

Taylor (1986) proposes the *value-added model*, a descriptive model that captures a full spectrum of information systems and services including functions of human intermediaries. The central notion of this approach is to see information systems and services as "a series of formal processes by which the potential usefulness of specific input messages being processed is enhanced" to meet the requirement of users (p. 6). Two fundamental premises underlying the *value-added model* are: (1) it is concerned about the praxis of information organization, processing and provision, and (2) it stresses the user-driven approach as a major input to system design, complementing the content-driven and the technology-driven models. Thus, even though the model has been developed based on analysis of formal processes of information systems and services and on the review of the literature describing the practice of information professionals[1], the approach emphasizes seeing such processes based on a user perspective. Assumptions behind the model are: (1) people make choices, consciously or unconsciously, in using information systems and/or services; and (2) all functions performed by information systems and services are adding value to potential information in order to meet the user criteria or values in such selection.

[1] The value-added model was developed based on the user criteria and values added to information systems and services elicited from examination of the abstracting and indexing process, and synthesizing the observations and experiences of skilled professionals as well as the literature (Taylor, 1986).

Following the Rouses (Rouse & Rouse, 1984), Taylor emphasizes the user value of information as the "central theoretical issue" (p. 135) of human IPS processes. He argues that even though users ask questions to IR systems or human intermediaries, the users may not be interested in simply receiving answers, but rather in addressing information problems (Taylor, 1968; Taylor, 1986). Thus, topically relevant messages presented by IR systems or human intermediaries in response to users' questions may have potential for value, but the messages become useful information only after being examined by the user based on *criteria of values* associated with users' information problems. Value of information in the *value-added model* is not limited to "exchange value" in a pure economic sense but rather has to do with "apparent value" – "what a user is willing to invest in terms of energy, time, lost opportunity and dollars for the information" (p. 19).

The user-driven approach of the *value-added model* emphasizes the shared value of a group of people. Taylor (1986) argues that the estimation of the user criteria or value in determining the usefulness of information requires an understanding of user context and/or his information problem within which information is sought and used. In order to obtain such understanding, questions of the user perception of her/his world and information behavior are unavoidable. Similarly, the effect of information on organizational context, such as performance or decision-making, is also unavoidable. User value, in this context, has to do with the benefit a user or an organization accrues as a result of obtaining and using information. Different groups of people (e.g., lawyers and managers) of the same organizational environment (e.g., a company) may evaluate a message given for the same question differently due to the differences in the nature of information problems they typically deal with. Thus, the differences in common information problems of a particular group of people are associated with their shared criteria in evaluating information (or information systems or services).

Based on the above arguments, Taylor (1986) proposes that the "major input to the design of information systems must come from the analysis of the *information use environment*" or IUE, which "establishes the condition of flow into, within and out of many particular entities," and "determines the criteria by which the value of the information message is evaluated." (p. 3), and provides a set of criteria to be used in evaluating information systems (see Appendix B5). He proposes that *IUE* can be described with four categories: set of people; characteristics of typical problems; setting; and resolution of problems. Using the framework of *IUE*, MacMullin & Taylor (1984) identified and described a variety of situationally based *problem dimensions* (e.g., design/discovery; well-structured/ill-structured; complex/simple; etc.) and various *information traits* (e.g., quantitative continuum; data continuum; temporal continuum; etc.). By so doing, they explore the fit between the users' problems and their expected use of potential information. Taylor (1991) further analyzes three information environments of engineers, legislators and practicing physicians in information terms to elicit the four categories of their *IUE*s.

Because of the limitation in existing IR systems built on technology- and content-driven models[2], there is some distance between the output of IR systems in response to users' questions and the resolution of their information problems (or actual needs of users). Taylor (1986) calls this distance the "negotiating space" which is filled by "a range of intermediaries including analysts, knowledge experts, and consultants, who massage, combine manipulate, and interpret information to fit the problem needs of" users (p. 9). He argues that "the dynamics of the negotiating space in a very real sense define the time, efforts initiative, and even dollars a [user] must invest (cost) in order to extract information of use from the system (benefit)." He proposes to analyze *IUE* in order to obtain 'the understanding of and options within the negotiating space" (p. 33).

Parameters of Value

Hall (1977; 1982) explores the value system on which the users base their choices in purchasing and selecting commercial information services. They include access tools (i.e., indexes, abstracting services, and computer databases), information search services (i.e., those which provide searches for known facts for pre-defined questions); and information analysis services (i.e., those in which the user relies upon someone else both to find and to analyze the information available.) Based on a series of studies of industrial researchers using survey, interview and observation, he found that the variable that controls the decision is the function of the use rather than individual users defined by occupation or job title.

Hall (1977) examined different *parameters of value* for information (e.g., specificity, depth vs. breadth, timeliness) and how the kinds of information that would serve each value parameter might vary with different situations. He claims that "a given person may be acting as a scientist today, a searcher tomorrow, and a planner the next afternoon, and [that] the service he prefers will depend on his function at the moment." He maintains that "managers or users of information services whose function at the moment is research or operation or planning may attach different connotations to the same key words such as useful information, pertinence vs. relevance, depth vs. breadth, timeliness, time, and costs" (p. v). His findings suggest that users in the research function prefer original documents and tend to emphasize subjectivity. Whereas, those in the planning function often want a digest of ideas, not documents or reference, and tend to judge a service first according to its reliability. By contrast, those in operation functions are satisfied with abstracts and emphasize quantifiable factors such as time and money.

Life in a Small World

As opposed to the two previous versions of *shared-value approaches*, both of which focus on information behavior in an organizational context, Chatman's (1991) *life in a small world* is based on her inquiries into information poverty. Through a series of studies of janitors, single mothers, and elderly populations, she

[2] Technology-driven models are based on limitation in "the size, shape, dynamics, and even the content" of technology-driven systems due to the nature of the technology (e.g., books, computers, etc.), which affect ways of storing, accessing and disseminating potential information (Taylor, 1986, p. 23), while content-driven models, derived from the traditional classification of knowledge and associated subject-based indexing, have "established the boundaries and objectives of content-driven systems" (Taylor, 1986, p. 25).

developed a set of concepts that capture the life-world of information-poor populations: risk-taking, secrecy, deception, and situational relevance. She claims that because of their low social status, insiders of the small world "reinforce information poverty by neglecting to accept sources of information not created by themselves." (Chatman, 1996, p. 193). Even though quite different from the previous two approaches which posit IPS in organizational settings, her findings also support the notion of shared information value – the legitimacy of information behavior is largely determined by social and cultural norms and mores.

Behavioral Approach Taken by Sheffield School

Wilson and his colleagues (Wilson, 1981, 1990, 1997; Wilson & Streatfield, 1981; Ellis, 1989a, 1989b) of the "Sheffield School" advocate a *user-centered behavioral approach* to IPS, employing qualitative and observational methods as the alternatives to the traditional positivistic "normal" science approach to user studies. The behavioral approach of the Sheffield School emphasizes the following:

- Focus on IPS behavior rather than information need or use.
- Situationality is a crucial aspect in identifying patterns of IPS behavior.
- Situationality and characteristics of IPS behavior may be shared among people who are working in the same or similar environment.
- Social and cultural aspects of information environments develop shared norms and values of people. These aspects are important for a deep understanding of their IPS behavior.

Even though their approach emphasizes observable IPS behavior rather than internal (cognitive or affective), Wilson (1981) stresses the significance of social aspects that may link cognitive and affective dimensions of individual information behavior. He proposes that:

> Because the situations in which information is sought and used are social situations, [italics in original] however, purely cognitive conceptions of information need are probably adequate for some research purposes in information science, but not for all. Information may also satisfy affective needs, such as the need for security, for achievement, or for dominance... while the nature of the organization, coupled with the individual's personality structure, will create affective needs such as the need for achievement, for self-expression and self-actualization. The particular pattern of needs and the resulting form of information-seeking behavior will be a function of all of these factors, plus such as the organizational level at which a role is performed and the 'climate' [quotation mark in original] of the organization (p. 9).

He proposes that factors related to information need and information-seeking behavior should be broad enough to include aspects of environments within which the work-role is performed, including not only the immediate

work environment but also the socio-cultural environment. Apparently, he emphasizes the importance of social context of IPS process in determining users' information behavior.

Social Informatics

Social informatics is an area or approach of research that captures design, use and implications of information and communication technologies based on broader social and cultural contexts. This approach is shared among a wide range of disciplines including sociology, anthropology, computer science, management, information systems, communication and LIS (Kling, et al., 1998). According to Kling, et al (1998), *social informatics* is defined as

> The interdisciplinary study of design, uses and consequences of information, and information and communication technologies, and their interactions with institutional and cultural contexts (p. 1048).

Research under this approach explicitly accounts for the behavior of users and their organizations in relation to their differences in social values, beliefs, and power in their relationships.

Some recent works in IR may be categorized under *social informatics* research. For example, Karamuftuoglu (1998) developed a theoretical framework to capture collaborative IR interaction that involves shared efforts in IPS processes involving multiple users. He argues that "the fundamental theoretical issues of [IR] are the production and use (consumption) of knowledge" that involves interactive collaboration among users in a discourse community. He makes distinction between two functions of IR interaction. According to him, the function of transfer of public knowledge from documents to individual users (search paradigm) emphasizes ways of describing documents (documentation). On the other hand, the function of production of new knowledge (new documents, ideas, etc.) through interaction among multiple users through IR interaction emphasizes generation and evaluation of new ideas and knowledge by reading pertinent texts and communicating with other people. He proposes to see IR systems as human communication mediated by computer networks (e.g., Usenet Newsgroup, listserv, Internet Relay Chat, etc.) that facilitate the production and consumption of knowledge.

Cool (1997), on the other hand, proposes a model that captures the IR interaction as social interaction. She makes distinctions among three goals of IR interaction: "(1) task, (2) topically oriented, and (3) those which are centered around *situational assessment*" (p. 135). Using the *social interaction theory*, she identified four dimensions of *situational assessment* including (1) self-performance, (2) norms of interaction, (3)

[3] Italic is in original

communication conventions, and (4) intersubjectivity. Based on the content analysis of verbal protocol obtained from 50 IR sessions performed by different expert searchers using a new IR system, she proposes that *situational assessment* is an important cognitive activity in new IR environments.

Three user-value approaches and the behavioral approach of the Sheffield School described above may be considered to be categorized within a larger framework of *social informatics*. In other words, those research approaches categorized in this study as the *social approach* may in fact be labeled as *social informatics* in LIS.

IMPLICATIONS OF SOCIAL APPROACH FOR THE STUDY

No empirical research examined using the *social approach* explicitly addresses users' perceptions underlining the human intermediation. But Nicholus's (1995, 1996) study of British journalists and politicians, following a *user-centered behavioral approach*, discloses some empirical evidence on this phenomenon. He found, as by-products of his study of practitioner users' self-searching, that a majority of British politicians' research assistants preferred self-searching for more control and flexibility, while only a small number of them delegate the search to the professional intermediaries. The research assistants delegate because (1) they perceive professional intermediaries to be experienced, helpful and able to do the search more quickly, (2) they could not find what they wanted through self-searching, and (3) there was a long queue at the terminal. These research assistants would handle the easier searches and ask the library staff to do the more difficult ones. Also, the research assistants prefer to conduct self-searching for politically slanted information while making search requests of librarians for neutral or factual information. On the other hand, self-searchers are minorities among *Guardian* newspaper journalists. However, most of them do generate both self-searching and human intermediation depending upon the situation. Their reasons for self-searching are: (1) inability to explain their information needs because they don't know what they are looking for, and (2) confidentiality concerns. Their reasons for delegation are: (1) proficiency of library staff, (2) difficulty of searching, (3) problems encountered in getting access, and (4) lack of time. Based on these findings, Nicholas (1995) concludes that self-searching and human intermediation are not mutually exclusive and the same user conducts self-searching sometimes but uses human intermediaries on other occasions. These findings suggest the adequacy of social approaches in addressing the research questions of this study.

APPROACH TO THIS STUDY

This study focuses on the use of human intermediation as seen by the user who generates them. More precisely, this research is inquiring into (1) tasks users request of intermediaries, and (2) situational factors possibly associated with the use of human intermediation as seen from users. The study further inquires into (3) patterns between users' internal and external situations and tasks they request of human intermediaries.

Different from existing studies, this study intends to view the phenomenon of human intermediation from users' perspectives, tries to make distinction among different types of tasks requested by users of human

intermediaries, and attempts to capture the user's external (social and environmental) situations as well as internal (cognitive and affective) states to explain why and how users decide to make use of human intermediation. The study assumes that IPS is a process and that the use of human intermediation is a particular activity initiated by the user and is encompassed within the IPS process.

This research uniquely defines IR systems to include not only bibliographic databases, as in the case of most of the existing studies of human mediated IR interaction, but also non-bibliographic ones that include fulltext, numeric, and graphic data. By defining the scope of IR systems broadly, this research is expected to reflect increasing availability of a variety of electronic sources including those of the Internet.

Because this research is unique in the above aspects, findings on the phenomenon of human intermediation as reviewed in the previous section may not directly apply by themselves. Thus, this research should be seen as an initial attempt to inquire into yet-to-be-investigated areas of IR and IPS research rather than a mere extension of human intermediation seen from professional intermediaries.

These considerations suggested this research take an exploratory approach. At the same time, however, it should be advantageous to make the most out of what already was known about human intermediation through the literature in order to pay respect to the cumulative nature of scientific research. Thus, this research is built on models and findings borrowed from existing research of IR interaction and IPS from different perspectives as guideposts to lead the design and data analysis. Accordingly, this research used findings and models of existing studies in developing taxonomies to be used as a preliminary framework.

Following sections will describe how this research utilized existing models and findings as initial tools to guide inquiry into the three research questions of this study.

MODELS AND FINDINGS GUIDED RESEARCH QUESTION #1: TASKS REQUESTED OF HUMAN INTERMEDIATION

The first research question asked in this study is:

Q1: What kind of tasks do users request of human intermediaries?

According to Allen (1996), information retrieval tasks can be defined on multiple levels. One level of tasks is external tasks "accomplished by users as they attempt to meet their information needs" (p. 29). The external tasks are general and device-independent. They are goals of an IR interaction and subgoals of IPS process. Another level of tasks proposed by Allen (1996) is internal tasks "accomplished while using information devices" (p. 30). They are device-dependent and, therefore, affected by the limitation of existing devices such as a particular IR system. For example, "query formulation" is an external task that may includes a variety of internal tasks such as selection of terms, definition of relationships among selected concepts and/or terms, and

development of search statements. These internal tasks differ depending upon IR systems and databases to be used. If a bibliographic IR system (e.g., DIALOG) is used and a database with a highly structured thesaurus (e.g., ERIC) is selected, the selection of terms may include browsing of the thesaurus. The definition of relationships among selected concepts may involve the use of Boolean operators. The development of search statements may involve the employment of DIALOG's command languages. These internal tasks, however, should be quite different if the searcher uses a fulltext system (e.g., LexisNexis) with a newspaper database without controlled vocabulary. Allen (1996) emphasizes the importance of carefully distinguishing these two levels and proposes to consider internal tasks to be subordinated to external tasks in order to facilitate innovative system design. This research may involve a variety of IR systems and databases as selected by users or intermediaries. Thus, the level of analysis of tasks should be external so as to eliminate the effects of different IR systems and databases.

Allen (1996) refers to Kuhlthau's (1985; 1992) six-step model of *information search process (ISP)* as one of the most elaborated external task models of IPS process. As examined earlier, Kuhlthau's *ISP Process Model* is very similar to Eisenberg and Berkowitz's (1995) *Big 6 Model* (Appendix B1 (1)) that was used as a guide to lead this study. The reason for this research to rely on the *Big 6 Model*, rather than Kuhlthau's ISP model, is its potential applicability to a wider variety of IPS tasks not limited to educational purposes. Thus, the Big 6 Model has the potential to take into account the social aspects of IPS behavior typically operating in IPS processes for informational purposes (White, 1992), the emphasis of this study. Allen (1996) also refers to Marchionini's (1995) five-step process of user searching of fulltext or bibliographic databases as a model of external tasks. They are: (1) defining the problem, (2) selecting the source, (3) articulating the problem, (4) examining the results, and (5) extracting the information. Fidel and Soegel's (1983) model of tasks performed by professional intermediaries in searching of bibliographic databases, as described in the previous section, may also be considered as a model of external tasks.

Table 3-3 compares and contrasts three models of external tasks of IPS and IR processes. Even though some of the tasks in *Big 6 Model* do not have equivalent tasks in either Marchionini's or Fidel and Soagel's, the first four steps of the *Big 6 Model* correspond well to the other two models. However, the last two stages of the *Big 6 Model* do not find corresponding tasks in either of the other two models. This inconsistency in the three models is at least partially due to the ambiguity of post-logoff activities as well as of the limitation to bibliographic databases used in Fidel & Soagel's (1983) model as addressed in the previous section. Thus, the *Big 6 Model* (Appendix B1 (1)) was chosen as the initial framework to analyze tasks requested of intermediaries as the tool to guide the data-collection and analysis in answering the first research question RQ1.

Table 3-3: Comparison of Three Models of External Tasks in IPS and IR Process

Big 6 Model (General IPS tasks)	Marchionini's (1992) Model (User tasks in IR interaction)	Fidel & Soagel's (1983) Model (Tasks of intermediaries in bibliographic IR interaction)
1. Task Definition	Defining the problem 3. Articulating the problem	
2. Information Seeking Strategies		1. Query formulation
3. Location and Access	2. Selecting the source 3. Articulating the problem	Selection of search system(s) and database(s) Interaction with the search system(s) and database(s) Termination of the search and final set
4. Use of Information	4. Examining the results 5. Extracting the information	5. Post-logoff activities
5. Synthesis		
6. Evaluation		

* Numbers used in this table reflect the original categories of respective models.

MODELS AND FINDINGS GUIDING RESEARCH QUESTION #2: FACTORS ASSOCIATED WITH THE USE OF HUMAN INTERMEDIATION

This section provides a preliminary framework based on empirical findings and models in relation to the second research question being inquired into in this research:

Q2: What situational factors do users perceive to be salient when they make requests of human intermediaries?

This research assumes both internal and external factors operate in users' selection of IPS behavior in general and the use of human intermediation in particular. This assumption fits well with the triadic reciprocity of person, environment and behavior as proposed by Bandura (1986) and presented in his *social cognitive theory*[4].

[4] Even though the theory is generally referred to as "social learning theory," this study uses the term "social cognitive theory" to accept Bandura's (1986) claim that the theory not only covers descriptive but also "motivational and self-regulatory mechanisms...that extend beyond issues of learning" (p. xii).

According to Bandura (1986), in the model of *reciprocal determinism*:

> ...behavior, cognitive and other personal factors, and environmental influences all operate interactively as determinants of each other... The term determinism is used here to signify the production of effects by certain factors, rather than in the doctrinal sense of action being completely determined by a prior sequence of causes operating independently of the individual. Many factors are often needed to create a given effect. Because of the multiplicity of interacting influences, the same factor can be a part of different blends of conditions that have different effects (p. 23-24).

IR and IPS researchers who take user-centered perspectives have long assumed IR and IPS are goal-directed behavior (Bates, 1979a; Borgman, 1996; Fidel, 1991; Hert, 1997; Katzer, 1987; Kuhlthau, et al., 1992; O'Day & Jeffries, 1993b; Rouse & Rouse, 1984; Saracevic, et al., 1988; Spink, 1977b; Taylor, 1986; Xie, 1998).

Bandura's *social cognitive theory* defines goals as cognitively represented future events that motivate present human behavior:

> In cognitively generated motivation, people motivate themselves and guide their actions anticipatorily through the exercise of forethought. They anticipate likely outcomes of prospective actions, they set goals for themselves, and they plan courses of action designed to realize valued futures (Bandura, 1989, p. 19).

According to Bandura (1986), *social cognitive theory* incorporates multiple levels of goals and explains how higher-level goals of general principles control lower-level goals of context-specific plans. He says:

> Social cognitive theory distinguishes between distal goals and proximal subgoals. End [distal] goals serve as general directive function, but specific subgoals determine people's immediate choice of activities and how hard they will work on them (Bandura, 1986, p. 473-474).

This notion of *multiple levels of goals* seems to be useful in connecting the gap between IR and IPS research. User goals of using IR interaction may be considered as *proximal sub-goals* of users' IPS processes. A user may engage in an IPS process with a specific goal (e.g., conduct research, write a paper, do a reading assignment for a class, make a decision) in mind. The user chose to use human intermediation at some point in the IPS process with specific goals (e.g., decide the topic, find relevant documents useful for literature review, verify own knowledge or search process/result) in mind which is a *proximal sub-goal* of the IPS goal. The IPS goal may be a proximal sub-goal of distal goals that are on a higher level.

Another assumption of this study is the situationality of human information behavior. Suchman (1987) advocates a view of situated action as the basis of purposeful human communication behavior. She proposes that all kinds of goal-directed human communication behavior, including interactive computing, consists of a set of interaction in which the actual action is contingent on a particular situation, and thus is essentially ad hoc. Thus, she insists, studies of user behavior as well as system design of interactive machines should make situationality the central focus. Situationality of IR interaction is also emphasized by many researchers of IR and IPS (O'Day & Jeffries, 1993a, 1993b; Hert, 1995; Spink, 1997a).

Thus, this research categorizes potential factors by using two axes of personal vs. social & environmental aspects and of situational (dynamic) vs. static aspects as shown in Appendix B2 (1). I assumed that there might be an unlimited number of potential factors possibly associated with users' decision to use human intermediation. However, it was not possible or realistic to include all potential factors in the taxonomy. Thus, only those factors that were explicitly mentioned by the literature on IR and IPS and reviewed in the previous chapter were included in Appendix B2 (1). Other factors, if important, should have been elicited during the data collection and analysis phase of the study. The taxonomy was used as the tool to guide the data-collection and analysis in answering the second research question RQ2

CHAPTER CONCLUSION

The intention of this chapter was to review the approaches in IR and IPS research considered relevant for the study. The aims of the literature review in this chapter were:

- To support the choice of the user-centered research perspective,
- To justify the choice of the approach appropriate for the research questions from among potential user-centered approaches,
- To identify frameworks that should be useful as a preliminary guide for research design and data collection.

The result was synthesized as follows:

1. The social approach was chosen, because this user-based approach emphasizes the social and environmental impacts on human IPS behavior in addition to internal (cognitive and affective) aspects, which is adequate for the study context.
2. A preliminary framework was identified for each of the two major research questions. A taxonomy of potential tasks requested of human intermediaries was chosen for guiding the first research question RQ1, and a taxonomy of potential factors associated with the use of human intermediation was developed for guiding the second research question RQ2.

CHAPTER FOUR

METHODOLOGY OF THE EMPIRICAL STUDY

This chapter describes the research design and procedures used in this study. The key methodological issues to be addressed are:

- Assumptions underlying the research design;
- Methodological challenges;
- Research design;
- Data collection and analysis techniques; and
- Methodological limitations.

ASSUMPTIONS UNDERLYING THE RESEARCH DESIGN

The following assumptions were developed in order to establish bases for the research approach and design.

TASKS REQUESTED OF INTERMEDIARIES

The first research question (*what kinds of tasks do users request of human intermediaries?*) is intended to identify and categorize information problem solving (IPS) tasks requested by users of human intermediaries. Because this research took a users' perspective, the requests made by users, rather than tasks actually performed by the intermediaries, should be examined as the source of tasks to be elicited and categorized. These tasks should be elicited from (1) users' request messages sent to the digital reference service (DRS) and (2) users' articulation of their requests through an interview.

FACTORS ASSOCIATED WITH THE USE OF HUMAN INTERMEDIATION

The second research question (*what situational factors do users perceive to be salient when they make requests of human intermediaries?*) is intended to capture the dynamically changing situational factors associated with users' initiation of the use of human intermediation. The study assumed that some of the dynamic factors might not have been identified in the literature. This was because most of the existing research tends to concentrate on users' internal (cognitive and/or affective) factors without taking into consideration a full spectrum of external (social and environmental) factors possibly operating in the use of human intermediation. Therefore, the methodology should explicitly try to capture yet to be identified social and environmental situations of users.

IPS PROCESSES AS DYNAMIC SITUATIONS

This research assumed that the use of human intermediation is a particular activity encompassed in the user's IPS process. This assumption suggested that this research should view the process of an IPS as structured by dynamically changing situations. In other words, users make decisions on their action (i.e., of the use of human intermediation) consciously or unconsciously, based on what happened and what is going on while they make use of human intermediation as well as on what they anticipate happening during and after the intermediation. Thus, the study should try to capture as much as possible the entire process of an IPS, while the focus of the study was the moment at which the user made a request of human intermediaries.

METHODOLOGICAL CHALLENGES

This research has two major methodological challenges. One is to capture users' naturally occurring IPS processes from the users' perspective in order to identify tasks requested of intermediaries and situational factors, rather than to confirm the effects of already identified variables. The other is to observe both internal and external situations of users in relation to their use of human intermediation. The following sections articulate these challenges as well as how this research addressed them.

CAPTURING NATURALLY OCCURRING HUMAN INTERMEDIATION

Most of the variables used in this study have not yet been fully explored empirically. For example, even though IPS tasks being performed by users in self-searching have been studied (Kuhlthau, 1992; Marchionini, 1989), they have not been examined empirically as tasks requested of human intermediaries. Situational factors found by empirical research as associated with users' IPS behavior were limited to users' internal (cognitive and/or affective) states, rather than external (social and environmental) contexts. Moreover, users' IPS processes themselves have only been examined within limited educational contexts using students as respondents.

This research was designed as an exploratory study so as to capture yet-to-be identified categories, factors and IPS processes. In other words, this study intended to (1) gain insights into characteristics of tasks requested by users of human intermediaries, (2) identify not only internal (cognitive and/or affective) but also external

(social and/or environmental) factors that might be associated with users' decision to use human intermediaries, and (3) examine possible associations between tasks requested of human intermediaries and situational factors within users' IPS processes.

Even though this study utilized models and findings of existing research as guiding tools, it could not use an experimental or quasi-experimental research design. This is because the major purpose of the study was to expand these findings and models by identifying new variables and hypotheses rather than to test existing hypotheses drawn from these models and findings. Artificially developed information problems or other externally imposed experimental conditions might impact significantly on the internal (cognitive and/or affective) and external (social and/or environmental) situations of users. Thus, the study took a naturalistic approach so as to capture naturally occurring human IPS processes that include human intermediation, based on users' perspective, while minimizing as much as possible introduction of distortions into the processes.

LIMITATION IN ELICITING SITUATIONAL FACTORS

This study needed to identify (1) what stimuli or factors users perceive to be important at the moment when they decide to use human intermediaries and (2) how users make the association between stimuli and their decision. Thus, the methodology should be able to elicit not only the stimuli that users perceive to be important in relation to such decisions but also the higher-level cognitive process of reasoning – what associations users make between the stimuli and the decision to use human intermediation.

Users are likely to have made decisions to use particular type of human intermediation, consciously or unconsciously, prior to their action of making requests. However, it is not possible to predict when such a decision will be made, or when the users perceive the stimuli that generate the decision. Thus, it is impossible for the researcher to plan to be present when the user makes such decisions. Moreover, it is impossible for the researcher to directly observe the decision-making process of the users, because the internal process of the user, or what is going on in the user's mind, is not directly observable by the researcher anyway. Thus, the research inevitably relies on users' self-reporting of their perception of the stimuli and their higher-order reasoning processes, at a later time, after such decisions have already been made.

Self-reporting of internal processes is known to have several drawbacks:

- People tend to reconstruct the processes to legitimize their behavior as rational (Ericsson & Simon, 1984),
- People's attention is selective – many stimuli are processed unconsciously and only those perceived to be important are retained in the memory of the reporter (Petty & Cacioppo, 1986),
- People have difficulty articulating how they "do things in general" (Simon & Burstein, 1985),
- People may not report self-negative stimuli to a stranger even when they are important (Bates, et al., 1995).

Nevertheless, this study unavoidably relied on the self-reporting of users, because the tradition of behavioral science has not yet developed the strong methodology necessary to overcome these drawbacks.

According to Nisbett and Wilson (1977), self-reporting of internal process is more reliable when:

- The time interval between the occurrence of the process and the reporting is minimal,
- The magnitude of the stimuli (causes) and behavior (effects) are in balance,
- The culture or the subculture of the reporter legitimizes the association between the stimuli and the behavior,
- The candidate stimuli are few in number, and
- Stimuli are perceptually or memorially salient to the reporter.

Thus the study tried to minimize the drawbacks and to keep users' self-reporting as reliable as possible by paying conscious attention to the above key points by:

(1) Collecting real-life experience to minimize possible memory loss,
(2) Encouraging participants to speak about what they actually thought, felt and did, rather than what they think they should have thought, felt and done, and
(3) Asking participants their perceived importance of the incident as well as their evaluation of and satisfaction with the outcome in order to make sure the incident was memorially salient.

Regardless of the compromise due to the limitations of existing methodology, the approach taken by this study is still exploratory. Marshall and Rossmann (1994) defined the purpose of an "exploratory" approach as:

> ... to investigate little-understood phenomena, to identify/discover important variables, and to generate hypotheses for future research (p. 41).

The study used existing models and findings based on the intermediaries' perspective of human intermediation, but it still investigated little-understood phenomena of the uses of human intermediation as seen from users' perspective, tried to discover important variables and associations among them, and to generate new hypotheses for future study.

The study's design is naturalistic. Patton (1990) defined the "naturalistic inquiry" as:

> ... studying real world situations as they unfold naturally, non-manipulative, unobtrusive, and non-controlling; openness to whatever emerges – lack of predetermined constraints on outcomes (p. 40).

This study collected data of participants' self-reporting at a later time, and therefore, might include reconstruction of situations made by study participants. However, it still tried to capture naturally occurring real world situations in the least obtrusive way without manipulation and controlling.

OVERVIEW OF RESEARCH DESIGN

The study consisted of three research phases. Figure 4-1 describes these phases at the conceptual level, while Table 4-1 synthesizes the major research activities performed in the study. All details are explained in later sections.

RESEARCH DESIGN PHASE 1

This section presents an overview of phase 1 of the research procedure.

Literature Review

The purpose of the literature review, in terms of the research process, is to uncover the conscious and unconscious assumptions underlying the problem of the study and to prepare the investigator as a master of the theories and findings relevant to the phenomena of the study (McCracken, 1988). My experiential knowledge guided to locate and examine appropriate literature for the purpose of the study, while the activity of reviewing literature and observation of users enhanced and modified structure of domain knowledge.

Development of the Preliminary Conceptual Model

The review of relevant literature, helped by the expanded experiential knowledge, derived research questions and the initial framework (conceptual model) of the study to be the basis for its data collection and analysis. Specifically, the *Big 6 Model* (Appendix B1 (1)) was identified as the initial framework for analyzing and categorizing tasks requested of intermediaries, while the *Taxonomy of Potential Factors Associated with the Use of Human Intermediation* (Appendix B2 (1)) was developed as the initial framework for analyzing and categorizing situational factors possibly associated with the use of human intermediation.

Design of Data Collection Instruments and Procedure

The initial framework was incorporated into the design of data collection instruments and used to help develop the procedure of data collection and analysis. The procedure and instruments were tested with a small sample[1] and revised.

[1] The interview procedure and instruments were tested through face-to-face interviews with two medical researchers, two SU faculty members, two business practitioners, and four doctoral students. They were revised and tested through telephone interviews with two retired K-12 teachers.

Selection of Study Settings

The unit of analysis of this study was a request that represented a use of human intermediation encompassed within a naturally occurring information problem solving (IPS) process as seen from the point of view of a user. Thus, study data should be collected from users of human intermediaries. I developed five criteria for the selection of the user population: (1) they have access to the human intermediaries, (2) they have access to the Internet, (3) they represent a wide variety of settings; (4) they represent an adult population; and (5) they are approachable from the study.

Figure 4-1: Research Design

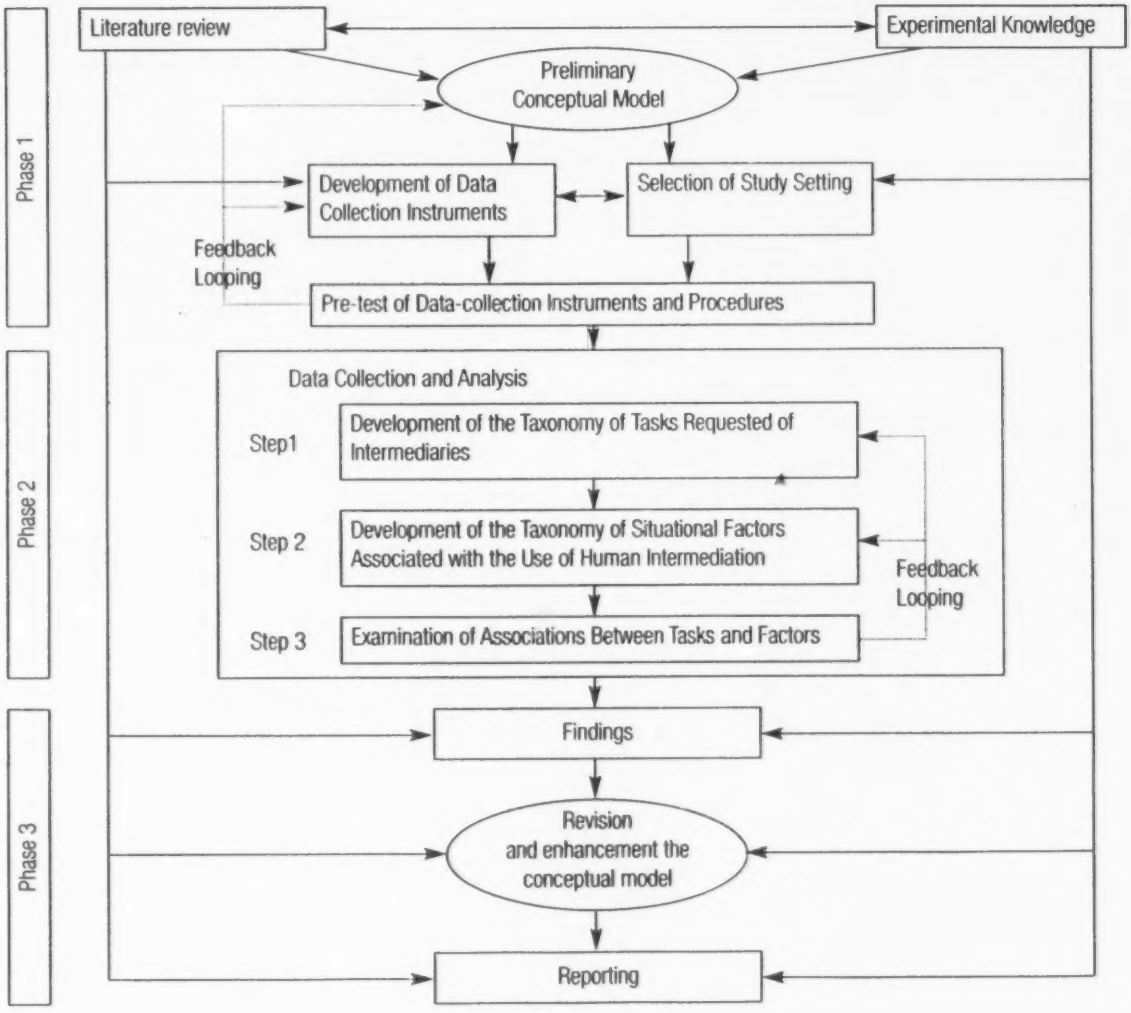

Table 4-1: Major Activities Performed in Each Phase of the Research

Phase	*Major Activity*	*Description*
Phase 1	Literature review	Synthesis of assumptions underlying the problem of the study
	Development of the preliminary conceptual model	Identification of potential taxonomies of (1) tasks requested of intermediaries and (2) situational factors possibly associated with the use of human intermediation
	Design and pretest of data collection instruments and procedure	Design and pretest of interview schedule and interview guides
		Selection of study settings
		Pre-test the procedure of developing and refining taxonomies of tasks requested of intermediaries by examination of a small sample of request messages
Phase 2 Step 1	Data collection: systematic sampling of past requests Data analysis: content analysis of past requests	Collection of past requests of online question/answering services Development and refinement of the taxonomy of tasks requested of intermediaries based on content analysis of a sample of past requests
Step 2	Data collection: telephone interview Data analysis: modified constant comparison	Collection of situational factors and tasks requested of intermediaries Development and refinement of the taxonomy of situational factors associated with the use of online question/answering services; Refinement of taxonomy of tasks requested of intermediaries
Step 3	Data analysis: modified constant comparison	Identification of associations among situational factors and tasks requested of intermediaries
Phase 3	Modification of conceptual model	Revision and enhancement the conceptual model
	Reporting	Interpretation and writing of research findings

The first criterion was the baseline of the required conditions of users. If a person does not have any access to the human intermediaries, s/he would hardly generate the use of human intermediation. The second criterion was important for the purpose of the study that sought to identify why and in what situations people use human intermediaries rather than using IR systems by themselves. In this study, the Internet was used as the instantiation of IR systems because users of the Internet have ready access to most of the search engines (IR systems) and web sites (databases) without attending training sessions or obtaining passwords. Thus, there should be reasons other than accessibility of the Internet for users to make use of human intermediation. The third criterion, the requirement for the inclusion of a variety of settings was desirable in order to make findings of this study more transferable to diverse settings. The fourth criterion, adult population, was to avoid the unnecessary complexities involved in using minors as participants. Though I assumed that the internal and external situations of children might be quite different from those of adults, it was not feasible within the scope of this study. This is because the inclusion of minors in the study should necessarily involve their parents for ethical reasons. The fifth criterion, approachability, was important because the study needs to capture each

user's behavior of using human intermediation and associated situational factors seen from the user as part of her/his naturally occurring IPS processes. Thus the researcher should be able to understand the user's self-reporting of the request and associated situations.

The AskERIC Online Question-Answering Service (AskERIC Q&A Service) was selected as the site to recruit participants of the study, because its clients are representative of users of human intermediation and fulfill most of the above criteria. They have access to human intermediaries (i.e., AskERIC support staff) and the evidence of their use of human intermediation (i.e., AskERIC Q&A Service) is readily available as request messages. They have direct access to the Internet because they send requests using AskERIC Website or e-mail. A recent survey of AskERIC clients found that they represent diverse settings[2]. Since the AskERIC service is focused on educators, most of its clients should represent an adult population. I was familiar with AskERIC clients through my experience in conducting an online survey in the Gateway to Educational Materials (GEM) Project[3] as a research assistant. On the other hand, the study could not observe users directly nor could face-to-face interviews be arranged due to the fact that most of AskERIC clients live and work a great distance from the research site.

Pretest of Data Collection and Analysis Process

A sample of 100 past requests made by AskERIC clients was analyzed using a content-analysis technique in order to verify the usefulness of the initial framework in categorizing tasks requested of intermediaries. Due to the limitation of the *Big 6 Model* in categorizing some of the request messages, it was modified. An interview schedule and an interview guide for pre-test were designed based on the revised taxonomy of tasks requested of intermediaries (Appendix B1 (2)) and the initial framework of situational factors (Appendix B2 (1))

Pretest telephone interviews were conducted during July and August 1998 with 15 AskERIC clients who agreed to participate. The telephone interview was tape-recorded and transcribed. Situational factors presumably associated with clients' use of AskERIC were elicited using a modified constant comparative technique. The interview guide was revised several times during the pretest in the following aspects:

- Changes were made in the order of some questions so that I could understand participants' situations more easily.
- Some questions were added in order to avoid misunderstanding.
- Changes were made in the structure of some of the questions (e.g., tasks requested of AskERIC) in order for the participants to easily understand the question.

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[2] Informal Marketing Survey for AskERIC, sent out between February 23rd and March 16th in 1998 with 28.4% response rate, found that its clients represent a wide variety of settings including K-12 teachers (29%), students (16%), faculty (10%), administrators (11%), librarians (10%), and parents (6%).

[3] A consortium effort that provides educators with quick and easy access to collections of educational materials found on various federal, state, university, no-profit, and commercial Internet sites, sponsored by the U.S. Department of Education (www.thegateway.org).

The interview procedure of the study was also modified after the pretest in the following aspects:

- Systematic sampling technique (every Nth request) was replaced by theoretical sampling to obtain a maximum variability within the context of the study setting.
- The timing of sending the initial recruitment message was changed from the day AskERIC received the request to three business days after so that the recruitment message would be sent to the potential participant right after s/he received a response from AskERIC. Since AskERIC usually responds to its clients within two business days after receiving requests, this condition was desirable to prevent the Hawthorn effect up to the point at which the participant receives an answer or information from AskERIC.

RESEARCH DESIGN PHASE 2

This section presents an overview of the phase 2 of the research procedure. Data collection and analysis techniques mentioned in this section will be fully described in a later section.

Development of the Taxonomy of Tasks Requested of Human Intermediaries

A sample of 500 past requests made by clients of AskERIC was analyzed in order to refine the revised taxonomy of tasks requested of intermediaries. Data elicited from a sample of past requests were content-analyzed. The refined taxonomy (Appendix B1 (3)) was incorporated into the theoretical sampling of study participants and the design of the interview schedule and interview guide used to collect study data from AskERIC clients.

The refined taxonomy (Appendix B1 (3)) was intended to be applied to categorize request messages of study participants. However, due to considerable discrepancies between what the original request message implied and what the participant said s/he requested later in the interview, the taxonomy was further refined by categorizing tasks requested based on the interview data. The final taxonomy (Table 5-1) was then applied to the request messages and interview data of the study participants to identify plausible sources of inconsistencies between request messages and interview data.

Development of the Taxonomy of Situational Factors Associated with the Use of Human Intermediation

I conducted telephone interviews with AskERIC clients in order to collect data about tasks participants requested and situational factors associated with their use of human intermediation (i.e., the AskERIC Q&A Service). During the interview, I elicited the task requested of the AskERIC Q&A Service and internal and external situations of each participant's IPS process. The interviews were audio-recorded and transcribed. The transcribed interviews were content-analyzed to identify tasks requested and associated situational factors. These tasks and factors were examined to refine the taxonomy of potential factors associated with the use of human intermediaries (Appendix B2 (3)) using a top-down strategy of modified constant comparative technique.

Examination of Association between Tasks and Factors

I examined the patterns between tasks requested of intermediaries and situational factors in order to discover possible associations between them. Based on the results of the analysis, working hypotheses were developed concerning the associations observed between tasks requested of intermediaries and situational factors as well as among situational factors.

RESEARCH DESIGN PHASE 3

The study's findings were compared with each other, and working hypotheses between categories were examined. Refined hypotheses were synthesized into a conceptual model. The data analysis process will be fully described in a later section.

TIMELINE OF THE STUDY

Table 4-2 presents the timeline for the conduct of the study.

Table 4-2: Timeline of the Study

Tasks / Schedule	Refinement of the Taxonomy of Tasks Requested of Intermediaries	Refinement of the Taxonomy of Situational Factors	Examination of Association Between Tasks and Factors	Milestones & Activities
April 1997 – August, 1998	Identification of the initial Taxonomy of IPS Tasks. Content analysis of past requests & revision of the taxonomy.	Development of the Taxonomy of Potential Factors Associated with the Use of Intermediaries. Development of data collection instruments.		Finalize the data collection instruments (interview guide) Pretest the data collection and analysis procedure
November 1998	Content analysis of a sample of 500 past requests.			
December 1998 – August 1999	Telephone interview & content analysis of interview data.	Telephone interview & content analysis of telephone interview data.	Data analysis	Finalize the Taxonomy of Tasks Requested of Intermediaries. Finalize the Situational Factors
September 1999 – October 1999				Comparison of tasks requested and situational factors.
November 1999				Revise & enhance conceptual model.
December 1999 – February 2000				Draft of dissertation.

DATA COLLECTION AND ANALYSIS TECHNIQUES

This study was planned to collect data from two sources. Tasks requested of intermediaries were planned to be elicited from request messages sent to AskERIC by study participants. Situational factors and demographic information were elicited from study participants by telephone interviews. However, I recognized during telephone interview, that there were considerable discrepancies between what the original request message implied and what the participant said s/he intended to request, in terms of tasks requested of human intermediaries. Therefore, the initial strategy was modified and data analysis was focused on the interview data for both (1) tasks requested of intermediaries, and (2) situational factors associated with the use of human intermediation. I analyzed these data using content analysis techniques employing a top-down strategy of a modified constant comparative technique[4]. The following sections describe data collection and analysis techniques employed in the study.

DEVELOPMENT OF THE TAXONOMY OF TASKS REQUESTED OF INTERMEDIARIES (STEP 1)

The goal of developing and refining the taxonomy of tasks requested of human intermediaries was to use it for the theoretical sampling of potential participants of the study in step 2.

Sampling of Past Requests

A sample of 500 past requests received during April 1998 was drawn from the archive of AskERIC using a systematic sampling technique (e.g., every 10th stratified by site and date). These requests were a naturalistic sample because they were generated during clients' naturally occurred IPS processes without any intervention by the research. They seemed adequate for eliciting a wide variety of tasks requested of the AskERIC Q&A Service by the clients.

Data Analysis Technique – Top-Down Strategy of Content Analysis

Content analysis technique was used to elicit tasks requested of intermediaries reflected in the sample of past clients' requests. Content analysis is a technique that seeks to find patterns and meanings in a variety of data unobtrusively (Krippendorff, 1980; Manning & Cullum-Swan, 1994). In this study, the initial data coding used a deductive (top-down) strategy by employing the Taxonomy of Tasks Requested of Intermediaries modified in pretest (Appendix B1 (2))[5] as the coding scheme for eliciting and categorizing tasks requested of intermediaries from the sample. An inductive strategy was introduced in a situation where tasks requested of intermediaries were not adequately categorized using the initial coding scheme.

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[4] The technique is also called as a modified analytic induction (e.g., Silverman, 1993).

[5] Originally based on *Big 6 Model* (Eisenberg & Berkowitz, 1995) and modified with content analysis of the sample of a smaller number (100) of past AskERIC requests in the pretest.

I followed general guidelines provided by Krippendorff (1980) to refine the taxonomy. I read request messages, elicited the portions of messages representing tasks requested of intermediaries, and coded them using the revised coding scheme. When I could not categorize a task by using the revised coding scheme, I assigned "Dunk (meaning other)," while I assigned multiple codes to the request message if I could not categorize it with a single code. After the initial coding, I examined the coding results. I dropped codes from the scheme if they were not assigned to any of the requests. When I noticed that the "Dunk" was assigned to many similar items, I introduced a new code that represented a particular type of task not included in the initial scheme and added it to the taxonomy. After I came to the point at which no new categories could be added to the scheme, I formulated the intermediate scheme and associated coding rules.

The scheme and coding rules were given to another analyst, and both the analyst and I coded the same subset of the messages (a randomly selected 10% of the sample request messages). The analyst and I jointly reviewed our coding decisions and confirmed that the scheme and rules were clear enough for any analyst to reach the same decision about coding for a request message.

The intercoder agreement was tested in order to verify that coding agreement was due to the reliability of the coding scheme and not to random chance. Several statistics are available to verify the reliability or reproducibility of a coding scheme (Krippendorff, 1980). This study used *Kappa* (Cohen, 1960), a statistic that represents a coefficient of inter-judge agreement for nominal scales[6]. A larger value of *Kappa* indicates higher inter-coder reliability. However, the adequate level of data reliability should be determined by the researcher based on the required level of validity imposed upon the study result, unless it is so low that the findings will be negligible (Krippendorff, 1980).

Table 4-3: Inter-Coder Agreement in Developing and Refining the Taxonomy of Tasks Requested of Intermediaries

Taxonomy Used	Data Used to Refine the Taxonomy	Data Used for Inter-Coder Reliability Check	Coefficient of Reliability for Each Coder*				
			A	B	C	D	E
Appendix B1 (2)	100 request messages received by AskERIC in April 1998.	100 request messages received by AskERIC in April 1998.	*.69*	-	-	-	-
Appendix B1 (3)	500 request messages received by AskERIC in April 1998	10% stratified sample of 500 request messages received by AskERIC in April 1998	*.72*	.68	.62	.60	.45
Final Taxonomy (Table 5-1)	62 Participants' request messages	A stratified sample of 10 request messages of 62 study participants.	-	-	*.72*	-	-
	62 participants' interview data	A stratified sample of 10 interview data of 62 study participants	-	-	*.94*	-	-

* Coefficient of reliability between coding by myself and by five analysts A, B, C, D, and E.

[6] $k = (P_o - P_c)/(1 - P_c)$: where P_o = the proportion of units in which the judges agree; and P_c = the proportion of units for which agreement is expected by chance

Table 4-3 describes inter-coder agreement in each step of developing and refining the *taxonomy of tasks requested of intermediaries*.

In the pretest, a stratified (every 50th) sample of 100 request messages received by AskERIC in April 1998 was content-analyzed using the *Big 6 Model* (Appendix B (1)) as the initial framework, and an interim version of the *taxonomy* (Appendix B (2)) was developed. The inter-coder reliability check was performed with one analyst (coder A) and resulting *Kappa* was .69.

In the main study, a stratified (every 10th) sample of 500 request messages received by AskERIC in April 1998, but not used for pre-test, was content-analyzed using the interim taxonomy (Appendix B1 (2)) as the initial framework, and the third version of the taxonomy (Appendix B1 (3)) was developed. The inter-coder reliability check was performed with five analysts (coders A, B, C, D, and E), and resulting *Kappa* were .70, .68, .62, .60, and .45 respectively. This taxonomy (Appendix B1 (3)) was used as the basis for theoretical sampling of potential participants of telephone interviews and incorporated into the design of the *interview guide* (Appendix A4).

The third version of the *taxonomy* (Appendix B1 (3)) was further refined by content analysis of request messages and interview data of 62 study participants, and the *final taxonomy* (Table 5-1) was developed. Inter-coder reliability check was performed separately for request messages and interview data using the final taxonomy with one analyst (coder C), and resulting *Kappa* was .72 and .94 respectively.

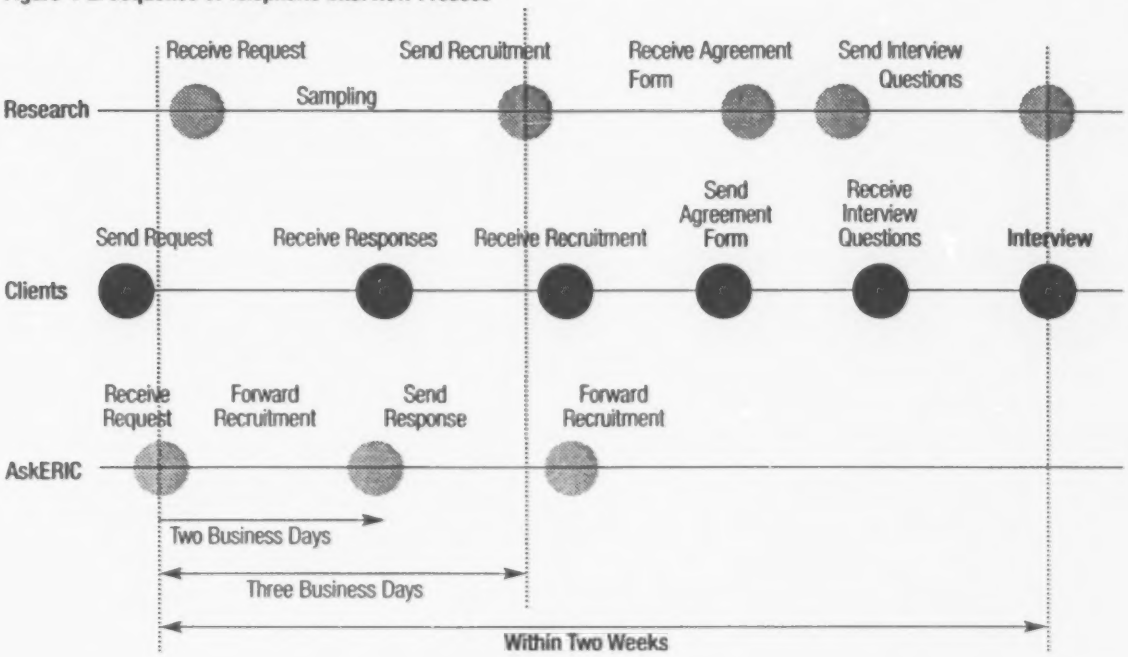
Recruitment Procedure

Recruitment and telephone interviews of participants were performed in four waves. Table 4-4 presents the schedule of recruitment and interviews processes for each wave. The sequence of e-mail exchange between the research, AskERIC, and clients (potential participants) are described in Figure 4-2.

Table 4-4: Schedule of Recruitment and Interview of Participants

Waves	Reception of Requests	Recruitment Message Sent-out	Reminder of Recruitment Message Sent-out	Interview Period	Number of Interviews Performed
Wave 1	12/7/98	12/10/98	12/14/98	12/13-21/98	15
Wave 2	1/11/99	1/14/99	1/18/99	1/18-25/99	18
Wave 3	1/25/99	1/28/99	2/1/99	2/1-8/99	15
Wave 4	2/8/99	2/11/99	2/15/99	2/15-22/99	17
Total					65

Figure 4-2: Sequence of Telephone Interview Process



For each wave, the *recruitment messages* were forwarded through e-mail to a sample of AskERIC clients three business days after AskERIC received their request using theoretical sampling technique[7]. The main reason for using the theoretical sampling technique was that the samples for naturalistic studies are not dependent upon statistical representation but on how well the sample answers research questions (Creswell, 1994). Since the third research question sought to discover associations between tasks requested of intermediaries and the situations of users, it was important to obtain a maximum variability of tasks so that a balanced number of participants were recruited for each task type.

The *recruitment message* was accompanied by two forms: (1) *agreement form* to be filled in by those who were willing to participate, and (2) *reason for not participating form* to be filled in by non-participants. Only those clients who were over 18 years old and lived in the United States were invited to participate. Those who agreed to participate in the study filled in the *agreement form* with their name, telephone number, two convenient time slots for the telephone interview, and state in which they live/work. Those who could not or didn't want to participate filled in the *reason for not participating form* with their reason(s) for non-participation. Both of these clients were instructed to send the form back to my e-mail address within five days (see Appendix A1 for the actual recruitment message).

[7] A systematic sampling scheme (every Nth requests received) was used for pretest, but resulted in over-representation of a particular type of request.

Table 4-5: Distribution of Task Codes Among Potential Participants (N=426)

Waves	A: Search- strategy	B: Source-locating	C: Fact-finding	D: Opinion-giving	Total
Wave 1	26	48	16	38	128
Wave 2	19	31	46	29	125
Wave 3	23	18	13	22	76
Wave 4	2	9	22	64	98
Total	70	106	97	153	426

Potential participants were selected using a theoretical sampling technique based on the task code(s) assigned to the request message in order to obtain the maximum variation of tasks. The distribution of tasks requested of AskERIC based on the analysis of their request messages using the revised taxonomy of tasks requested of intermediaries (Appendix B1 (3)) is presented in Table 4-5.

The *recruitment message* (Appendix A1) was forwarded by e-mail to a total of 426 participants. A *reminder for the recruitment message* (Appendix A2) was forwarded to them on the fifth day after the initial recruitment message in order to encourage participation in the study. Among them, 75 responded with the *agreement form*, while 89 responded with a *reason for not participating form* filled by reasons for non-participation. Reasons for non-participation in the study, provided by 89 participants who selected not to participate, are presented in Table 4-6. Twenty participants could not participate due to the selection criteria: they live/work

Table 4-6: Reasons for Non-Participation (N=89)

Category of Reasons	Reasons for Non-Participation	Participants
Selection criteria	Live or work in a country other than USA	12
	Age is less than 18	7
	Live in a country other than USA and age is less than 18	1
Other reasons	Not available for the interview due to business/vacation trip	17
	No time for the telephone interview	11
	Non-regular user	8
	Don't have access to telephone	5
	Want to be kept anonymous	4
	AskERIC didn't/couldn't answer the question	4
	Made request for other people (i.e., proxy user)	3
	Reasons other than above	8
	Don't want to participate in the study without specific reason	9
Cancellation	Telephone interview was scheduled but the participant was absent	10
Total		89

* "Reasons other than above" include loss of family member (2 respondents), anticipated child disturbance at the phone (2 respondents), critical to the methodology (1 respondent), incorrect phone number (1 respondent), being a non-US citizen (1 respondent), and scheduled own surgery (1 respondent).

in a country other than USA and/or are younger than 18 years old. Others gave personal and work-related reasons that prevented them from participating in the study. These reasons may imply potential biases that might have operated in the self-selection process of the participants. Participants were likely to be more available at home or work place and less busy during the data-collection period. They were likely to be less concerned about privacy than non-participants. They have access to a phone. They were likely to be *originators* who made requests based on their own information needs – only one participant was a *proxy* searcher. They were likely to have received good answers from AskERIC before they received recruitment messages of the study. However, interview data demonstrated that two participants did not receive any response from AskERIC at the time of the interview and at least four participants reported that they received poor responses from AskERIC.

In response to the *agreement form*, I sent an interview outline and the date and time of the telephone interview by e-mail. The recruitment process continued until theoretical saturation occurs. Theoretical saturation refers to the situation in which new data collected do not significantly contribute to the category being developed (Glaser & Strauss, 1967). When all categories reached this point, the collection of new data stopped.

Among 75 participants who agreed to participate in the study, 10 dropped out because they were not available for the scheduled interview. As a result telephone interviews were conducted with 65 participants.

DATA COLLECTION TECHNIQUE AND INSTRUMENTS

The study data were collected by structured interviews. This section describes techniques and instruments used for data collection.

Selection of Data Collection Technique

Several data collection techniques might be applicable in eliciting situational factors possibly associated with the use of human intermediation. They are: (1) real-time observation; (2) real-time verbal reporting; (3) diary (4) interview (face-to-face, telephone); and (5) questionnaire survey with open-ended questions (group administration, postal mail, e-mail). Each methodology has its own advantages and drawbacks for the purpose of the study.

Real-time techniques of observation are known to be more reliable than *post hoc* techniques in capturing a variety of internal behavior of users' IPS processes. However, these techniques are very limiting for this study that intends to capture people's IPS processes in a variety of settings. Real-time verbal reporting of the think-aloud technique has been widely used by IR researchers to capture the searcher's thought process and accompanied stimuli during IR interaction (Fidel, 1991; Hert, 1995). However, this technique was not applicable

for the study that sought to identify factors associated with users' decision-making processes of using human intermediation. That is, the occurrences of decision-making processes are hardly predictable. Thus, the researcher cannot plan to be there to observe the process.

Since real-time techniques were not applicable, this study inevitably relied on users' self-reporting at a later time when such decisions had already been made. This study employed a semi-structured interview technique in order to reduce such biases. Specifically, this study used a telephone interview with semi-structured questions supplemented by probe questions as well as with a few closed questions (see Appendix A4 for the *interview guide*). The reason for employing a telephone interview, rather than the face-to-face technique, was because most of the AskERIC clients live and work at a distance from the research site and it was almost impossible to arrange face-to-face interviews. The telephone interview was also appropriate for this study because the interviews could be arranged within an adequate time interval between the use of human intermediation and the self-reporting of the situations so as to increase the dependability of study data (Nisbett & Wilson, 1977).

Modified Critical Incident Technique

People's recollection of their general behavior is known to be limited (Simon & Burstein, 1985). Thus, users' self-reporting of recent real-life experiences concerning their use of human intermediation was elicited using an adaptation of the *critical incident technique* in order to increase the dependability and trustworthiness of the study.

The *critical incident technique* is a systematic approach for eliciting and analyzing detailed reports of behaviors leading to successful or unsuccessful outcomes on a task or process. The technique was originally developed during World War II to identify the competencies involved in the successful performance of American bomber crews, and has been widely used to define the skill requirements of various occupations. It can be used in either structured interview, or written questionnaire, with open-ended questions (Flanagan, 1954). The technique has been extensively used in studying user behavior of information services and systems (Lindberg, et al., 1993; Saracevic & Kantor, 1997).

The technique is very flexible in the way it can be adapted for a variety of settings, but should follow several basic principles:

(1) Incidents to be reported should be critical for reporters,
(2) Reporting of facts regarding behavior is preferable to the collection of interpretations, ratings, and opinions based on general impressions (Flanagan, 1954).

This study might not necessarily fulfill these principles due to the fact that incidents (i.e., use of human intermediation) were selected by the research and, therefore, might not have been critical for the participants.

However, the purpose of the study was not to find situational factors that contribute to successful use of human intermediation in IPS but to elicit situational factors associated with the use of human intermediation and requests for a particular type of tasks. Thus, this study might not need to fulfill these requirements if incidents were important for reporters. In order to fill this gap, one item of the interview questions (Q6) asked about the relative importance of obtaining needed information that led participants to the use of AskERIC. The study found that the perceived importance of obtaining the required information was very high (mean = 8.5 and median = 10 on a scale of one to 10). Also, two items of the interview questions asked for participants' evaluation of search results (Q21) and level of satisfaction with the use of AskERIC (Q22). The study also found that the evaluation score given by participants of search results was relatively high (mean = 8.3 and median = 9.5 on a scale of one to 10) and the satisfaction score for with the use of intermediation was very high (mean = 8.4 and median = 10 on a scale of one to 10). Thus, even though incidents reported were selected by the study, the relative importance of the incidents and a high level of success should have been maintained to ensure the memorability of the incidents. In addition, attention was paid to minimizing the time lag between the incident and the elicitation in order to minimize the possible memory loss. The telephone interviews were conducted within two weeks after AskERIC received the requests, since retention of memory is known to be dramatically reduced after two weeks (Flanagan, 1954).

Data Collection Instruments: Interview Guide

A *modified critical incident technique* was used in the telephone interview in order to capture participants' internal (cognitive and affective) and external (social and environmental) situations prior to and at the moment when they made the requests. The use of a *modified critical* incident technique would help participants readily imagine themselves in the role and thus, in essence, recreate the situation. At the time when they were interviewed, all but two participants had received and examined responses from AskERIC to their requests[9].

The interviewer used an *interview guide* (Appendix A4) that contained questions and probes in an organized manner. The purpose of using the interview guide was to allow the interviewer to make the best use of the time available for the interview and make interviewing of different participants more systematic and comprehensive (Patton, 1990). However, this does not mean that interviews were conducted in strict linear manner. Rather, the participants were encouraged to "tell their own story in their own terms," (McCracken, 1988) and the interview guide was used primarily as a checklist of areas that needed to be covered. In addition, each participant received an outline of the interview (Appendix A3) by e-mail a few days prior to the actual interview in order to help her/him prepare for the interview.

DATA ANALYSIS TECHNIQUE

Answers to closed questions were coded on the interview guide by the interviewer during the telephone

[9] AskERIC usually responds to clients within two business days after receiving requests.

interview, while answers to open-ended questions were content analyzed. This section describes techniques and instruments used for data analysis.

Demographic Variables

Though telephone interviews were conducted with 65 AskERIC clients who were willing to participate in the study, three interviews were discarded: two due to recording problems, and one due to too many discrepancies between the request message and interview data. Consequently, 62 participants' IPS processes were analyzed.

Table 4-7 summarizes the demographic variables of the 62 study participants.

Table 4-7: Demographic Variables of Participants (N=62)

Demographic Variables		Number of Participants	
Occupation	K-12 Teacher	20	(32.3 %)
	Administrator/Manager	9	(14.5 %)
	Student	8	(12.9 %)
	College & University Faculty	6	(9.7 %)
	K-12 Librarian/Media Specialist	3	(4.8 %)
	Other	16	(25.8 %)
	Total	62	(100.0 %)
Work Experience	Less than one year	9	(14.5 %)
	One to five years	20	(32.2 %)
	Six to ten years	7	(11.3 %)
	More than ten years	26	(41.9 %)
	Total	62	(100.0 %)
Gender	Female	49	(79.0 %)
	Male	13	(21.0 %)
	Total	62	(100 0 %)
Highest Education Completed	Some college	7	(11.3 %)
	Bachelor's degree	25	(40.3 %)
	Master's degree	22	(35.5 %)
	Certificate of advanced studies	5	(8.1 %)
	Ph D. or doctoral degree	3	(4.8 %)
	Total	62	(100.0 %)
Age	18-25	4	(6.5 %)
	26-35	10	(16.1 %)
	36-45	10	(16.1 %)
	46-55	34	(54.8 %)
	56-65	3	(4.8 %)
	Not Available	1	(1.6 %)
	Total	62	(100.0 %)

As shown in Table 4-7, participants represent a variety of occupations. Other than K-12 teachers who comprised one third of the participants, participants' occupations were diverse. "Other" categories include a variety of professions such as school counselor (1), school psychologist (1), reading consultant (1), speech language pathologist (1), instructional technology assistant (1), occupational therapist (1), video-tape editor (1), technical editor (1), urban planner (1), real-estate agent (1), telephone representative (1), registered nurse (1), process consultant (1), retail sales person, (1), self-employed scrap metallurgist (1), and homemaker (1).

The population of AskERIC clients is known to be female dominated. Reflecting this tendency, a great majority of the participants were female. Participants have completed a relatively high level of education, with most holding a bachelor's (40.3 %) or master's (35.5 %) degrees but a wide range of educational levels were represented. Concerning the age of participants, a majority of them were between 46 and 55, but others were well distributed in a wide range of generations.

Transcription of Interview Data

The tape-recorded interviews were transcribed by a third person in order to keep the adequate distance between the data and the investigator (McCracken, 1988). Transcribed answers to open-ended questions were re-examined in order to make sure all the relevant information was included in the transcription. The interview transcriptions were content-analyzed.

Content Analysis of Telephone Interview

In the pretest, I used a systematic sampling technique (i.e., every second request received on particular days) and found major participation biases: (1) participants who requested a particular type of task were over represented, and (2) female participants were over represented. These participation biases led to the modification of the initial sampling framework and the use of theoretical sampling in order to obtain a maximum variability of tasks within the context of the study setting so that the research should be able to answer RQ3 (*what patterns of associations, if any, are observed between users' situational factors and tasks requested of intermediaries?*). However, I noticed considerable discrepancies between what the request message implied and what the participant said in the interview s/he had requested. Thus, the initial categories of request messages based on the modified taxonomy of tasks requested of intermediaries were not used in the subsequent data analysis. Instead, the taxonomy of tasks requested of intermediaries was further refined by categorizing the interview data to develop the final taxonomy that will be presented in Chapter 5 (Table 5-1).

For situational factors, the initial data coding used a deductive (top-down) strategy by employing the modified taxonomy of potential factors associated with the use of intermediaries (Appendix B2 (2)) developed based on the literature and refined in pretest. An inductive strategy was introduced in the initial coding when situational factors were not adequately categorized using the initial coding scheme. Subsequent data analysis followed

inductive/deductive loops of modified constant comparative technique[10]. The final categories developed through the data analysis are presented in Appendix B2 (3). The modified constant comparative technique employed in the data analysis will be described in the next section.

Modified Constant Comparative Technique

As a general approach to qualitative data analysis, the constant comparative technique is concerned with generating and suggesting a number of categories, properties and hypotheses about the phenomenon of study. The technique consists of three overlapping stages of observation, coding and interpreting based on researcher judgments and inferences. Each stage consists of three component tasks of data collection, coding, and hypothesis generation, all combined to provide the means for careful examination of a phenomenon at a particular level of abstraction.

The three stages of the constant comparative process developed by Shelly and Sibert (1992) are:

- ***Stage one***: In the initial analysis stage, I was involved primarily in eliciting and categorizing data by assigning an appropriate code to each of the new data instances. Through this process, similar instances were grouped together as a category. In this early stage of coding, data instances were grouped in multiple ways, since early in the analysis it was not clear which categories would become fully developed and contribute to the hypothesis generation.
- ***Stage two***: As more data were collected and data instances were assigned codes, the emphasis shifted from data collection to within-category integration. That is, coded data instances were examined for the characteristics that determine their membership in the category in order to develop a list of properties for the category. However, the category and properties were dynamically changing until the analysis was completed. When the promising combinations of codes and properties emerged, data collection was discontinued and data analysis moved to the third stage.
- ***Stage three***: As the deductive/inductive loops continued, the focus was shifted to higher-level, more abstract representations of data – generation of working hypothesis through across-category integration. Once working hypotheses were generated, the analysis continued to explore the data in order to find out whether the working hypotheses applied. This iterative process continued until theoretical saturation was attained.

[10] Some researchers call the approach of qualitative data analysis using constant comparative technique that initially begins with a top-down deductive loop based on some preconception as modified analytic induction (e.g., Silverman, 1993).

DATA ANALYSIS PROCESS

This subsection summarizes the major analytical activities in the data analysis process.

Sources of Data Used in the Analysis

The following three data sources were used for data analysis:

- Interview transcripts: the major data sources used throughout the analysis process.
- Request messages: used to validate interview data in terms of topics or requests and tasks requested.
- Interaction log: used to validate interview data in terms of what participants received from AskERIC in response to their requests.

When the topic of a request message did not match the participant's description of her/his request in the interview, the interviewer asked more questions to make sure the participant did not send another request that corresponded to the original request message. The failure of the matching occurred for one participant (P39), which led to the discarding of the interview data from the analysis.

I recognized during the first wave of the telephone interviews that the tasks requested of AskERIC Q&A Service based on the preliminary analysis of request messages for the theoretical sampling often did not match what participants reported they requested in the interview, even though the topics of the request messages matched the topics they described. This unexpected situation led to the modification of the initial research design to use the interview transcript as the main source to elicit tasks requested and to exploration of the sources of such disagreements.

Analytical Framework

The following four analytical frameworks were used at different stages of data analysis:

- Taxonomy of Tasks Requested of Intermediaries (see Appendix B1),
- Taxonomy of Situational Factors Associated with the Use of Human Intermediation, and (see Appendix B2),
- Taxonomy of Evaluation Criteria (see Appendix B5),
- Four temporal segments of participants' IPS processes.

The first three schemes were developed prior to the data collection, while the last framework was employed in a later stage of data analysis in order to introduce a useful partitioning of IPS processes so as to perform a comparative analysis of complex relationships among categories.

Sequence of Data Analysis Process

Looking back, I identified six phases of the data analysis process, each concentrated on a particular analytic focus. The result of each phase shifted the focus of the subsequent phase of the analysis.

Phase 1: Coding Variables

As soon as data from 15 participants had been collected, transcribed and verified with the interaction log for the reliability check, I began coding using Atlas.ti – software for qualitative data analysis. The coding was done separately for the tasks requested and for the situational factors using a top-down strategy employing each of the first two analytical frameworks respectively. Coding of the tasks requested of human intermediation was done separately for the request messages and the interview data in order to examine the extent of agreement between these two. The unit of coding was on the paragraph level of interview data I partitioned in advance. First, a code category (e.g., tasks requested of intermediary) was assigned to the paragraph that captured the answer to a particular interview question (e.g., Q7). However, when the answer to a question was scattered over multiple paragraphs within an interview transcript due to *maxim* (Grice, 1975), a code category was assigned to each of relevant paragraphs. Second, sub-codes representing members of the category (e.g., a particular task requested) were assigned to each of the paragraphs. As new interview data were collected and transcribed, they were also coded. Through this initial coding, a few categories were discarded from initial frameworks, while several new categories were added.

Phase 2: Within Category Integration

Phase 2 of the analysis was also done separately for the tasks requested of intermediary and for the situational factors. The inter-coder reliability check was performed separately for coding of the request messages and the interview data using stratified samples (every sixth) of 10 request messages and the portions of interview data captured as relevant to the category in the phase 1 of the data analysis. The coefficients of reliability were lower for request messages (.72) than the interview data (.94) in terms of *Kappa*. The two distributions of task codes assigned to the request messages and the interview data for identical participants were compared, and a very low level of full agreement between the two (29.0 %) was obtained. At this point, I was convinced that the task code assigned to the request messages was not reliable; that led to some modification of the initial research design of using request messages as the bases of the tasks requested of intermediaries for the later analysis into a new design that employed tasks based on the interview data instead. In addition, plausible explanations for inconsistencies between request messages and interview data were explored. The results will be reported in Chapter 5. The final taxonomy of tasks requested of intermediaries is presented in Table 5-1.

For situational factors associated with the use of human intermediation, patterns of associations within each category were explored for the following nine categories:

1) Information needs
2) Goal-generating factors
3) Social function of user
   - *Capacity* acted by user in IPS (pre-defined and elicited in the interview)
   - User *role* in IPS (pre-defined and elicited in the interview)
4) Searching behavior
5) Experience of using AskERIC Q&A (pre-defined and elicited in the interview)
6) Perceived level of IPS skill (identified through constant comparative process)
7) Image of AskERIC Q&A (identified through constant comparative process)
8) Evaluation of human intermediation
   - Evaluation score (elicited in the interview)
   - Level of satisfaction (elicited in the interview)
   - Evaluation criteria (identified through constant comparative process using a top-down strategy employing Taylor's (1986) value-added model)
9) Information use
   - Artifact development
   - Information sharing

Phase 3: Find Focus on User Goals

The recognition that participants articulated their goals in multiple levels and referred to them in explaining their IPS behavior led the study to further explore the user goals. The study used the concept of goals in Bandura's (1989) *social cognitive theory* in the analysis and captured goals in three levels:

- Goals of using the AskERIC Q&A Service
- IPS goals
- Higher-level goals

Each participant's goals were summarized on the above three levels as presented in Appendix C1. Based on the analysis, IPS goals were grouped into eight properties and relationships between IPS goals and goals of using the AskERIC Q&A Service were identified (Table 5-1).

Phase 4: Find Focus on Reasons for Using AskERIC Q&A Service

I noticed by reviewing the part of the interview transcripts that captured reasons for selecting the AskERIC Q&A Service (answers to interview question Q12) that participants used many causal and temporal conjunctions. This recognition led the study to analyze causal and temporal relationships between reasons. This idea was also guided by the analytical technique of "pattern coding" recommended by Miles and Huberman (1994, p. 69). Causal and temporal relationships between two reasons were first identified within interview data of individual participant, and coded as "A=>B" for causal relationship and "A)B" for temporal relationship using causal terms (e.g., because, so, since, etc.) and temporal terms (e.g., when, then, after, as soon as, etc.). A global level of causal and temporal relationships of reasons shared among participants was developed as shown in Appendix C2. A visual map of relationships between reasons articulated by two or more participants was generated using the network editor of Atlas.ti (Figure 7-1). By examining the figure, I identified three situational variables as representing different patterns of causal and temporal relationships between reasons. They are: (1) whether participants did *self-searching before sending the requests*; (2) whether participants had *experience of using the AskERIC Q&A Service*, and (3) *perceived level of* participants' own *IPS skill*. This recognition led the study to analyze patterns of associations between reasons for using the AskERIC Q&A Service and these three situational variables.

Phase 5: Across-Category Integration #1

The associations between variables under different categories were explored by comparing values of variables between categories as well as by extracting relevant data instances that identified the extracted relationships. The level of analysis was on the individual participant. Through this process, a conceptual model that represents associations identified among user goals, tasks requested, and situational variables was developed (Figure 9-1).

Phase 6: Across-Category Integration #2

Finally, the third analytical framework of the "segments of IPS process" was introduced in the analysis in order to find patterns of changes in values of information needs, and affective states.

Even though all IPS processes studied in this research used the AskERIC Q&A Service, each of them represents a different information need and exhibits different information-seeking behavior. Since the purpose of this study was to identify patterns shared among the various IPS processes, it was necessary to impose some useful partitioning of these IPS processes in order to make it possible to perform a comparative analysis.

Based on the constant comparative analysis of each of the IPS processes collected from 62 participants, I grouped them into the following three patterns:

1) ***Fully-dependent searching***: Participants went directly to send requests to the AskERIC Q&A Service, without making any effort to find information by themselves. After sending the requests, they waited for the responses from the service without making any efforts to locate needed information from other sources/services until they received responses from the service.

2) ***Last-resort searching***: Participants tried to find information from other sources by self-searching or mediated/delegated searching before they sent requests to the AskERIC Q&A Service. After sending the requests, they waited for the response from the service without making any efforts to locate needed information from other sources/services until they received responses from the service.

3) ***Parallel searching***: Participants tried to find information from other sources/services by self-searching and/or mediated/delegated searching before they sent requests to the AskERIC Q&A Service. After sending the requests, but before receiving the responses from the service, they continued searching for information from other sources/services by self-searching and/or mediated/delegated searching.

These three patterns are described in three process charts in Figure 4-3. In each section of the chart, numbers preceded by a capital letter "P" represent a participant's ID number. The location of an ID number indicates the progress of the participant's IPS process at the time of the data collection. Since two participants engaged in last-resort searching (P12 and P34) reported they did not receive any response from the AskERIC Q&A Service, their IDs are located under "Sent Requests" in the process chart.

As shown in these process charts in Figure 4-3, participants' IPS processes before receiving responses from AskERIC were relatively simple. But they were very complex after receiving the responses, reflecting the characteristics of responses, the complexity of participants' information needs, and their internal and external

Table 4-8: Segmentation of IPS Processes

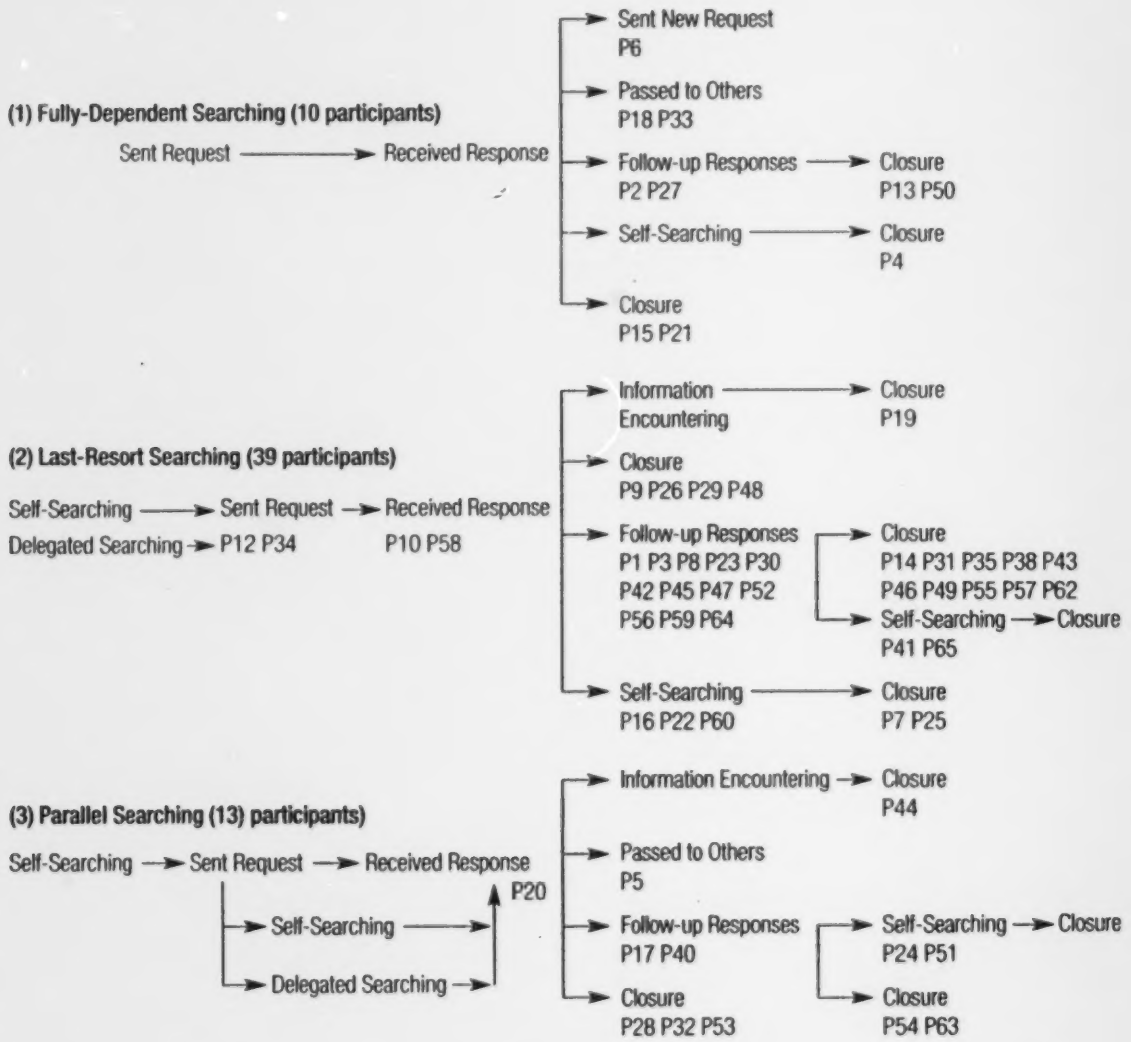
Segmentation	Segment 1	Segment 2	Segment 3	Segment 4
Description	Generation of information needs	IPS processes before sending requests	IPS processes between sending requests and receiving responses	IPS processes after receiving responses
Common IPS Activities	- Planning	- Self-searching - Delegated/ mediated searching - Selecting AskERIC	- Sending requests to AskERIC - Receiving responses from AskERIC	- Evaluate responses - Develop artifacts - Share information

situations. Thus, it was very difficult to categorize these patterns further, but after preliminary analysis (inter-category integration) of participants' IPS processes described above, I partitioned them into four segments as described in Table 4-8.

Software Used for Data Analysis

Atlas.ti, a software package for qualitative data analysis and management, was used to analyze data all through the research process. This software is capable of storing textual data in an organized format and allows the

Figure 4-3: Three Patterns of IPS Processes



coder to code any portions of data as quotations. Also, the software can present the analyzed data (quotations, codes, relations, etc.) in a variety of formats including frequency tables, code families, and network display. The software was useful in recording variety of memos in order to keep track of the research process. I familiarized myself in using the software prior to the conduct of the study by using it in coding and analyzing the pretest data.

METHODOLOGICAL LIMITATIONS OF THE STUDY

Any research has its limitations. This study was limited in capturing only those instances of human intermediation performed by a formal information service provided free of charge through an online environment on the Internet within the domain of education. In addition, findings of this study have the following limitations due to the methodology.

- Geographic settings: due to the fact that the study uses telephone interviews in data collection in order to capture participants' situations as naturally as possible, and due to limited resources, only those users who lived in the U.S. were recruited. Thus, situations covered by the study are limited to the settings of the geographic and cultural boundary.
- Age: because of the ethical and practical complexities that might result from recruiting minors, that necessarily involves their parents who have the right to be involved, this study recruited only adults. Thus, situations and settings covered by the study were limited to the adult population.
- Important and memorable situations: the study captured post-hoc self-reporting by participants of situations that might be associated with their use of human intermediation. Thus, this study captured only those situations that were important, memorable, specific and legitimate to participants. As a result, this study generated only a very limited picture of participants' internal and external situations possibly associated with their use of human intermediaries.

The phenomenon of study, the use of human intermediation, is the core issue of information professionals who have been striving to provide better service in ever-changing environments. In order for information professionals to serve in this function, they need to obtain a deeper understanding of the phenomenon from the users' perspective. But existing models and findings are mostly derived from information professionals' perspectives. Thus, these models and findings do not provide an adequate level of understanding of why and in what situations people make use of human intermediation. Thus, seeking a better understanding of the phenomenon from users' perspectives is a very important research agenda in information science, even though the findings are known to be very limited.

This study was merely a starting point to explore and understand the phenomenon rather than to prove or generalize from existing models and findings. Even though study findings are limited, the study has generated new hypotheses and new research questions. Thus, subsequent research will build upon the study findings and new research questions.

SUMMARY

This chapter has outlined assumptions, challenges, and the overall research design with techniques employed for data collection and analysis, as well as the methodological limitations. The research design of a naturalistic study evolves through inductive/deductive processes of data collection and analysis. This chapter, however, has identified and described major components of the study in order to indicate the rationale with which the study was formulated and conducted.

The goal of the study was to develop a better understanding of the complex phenomenon of the use of human intermediation in IPS processes as seen from users' perspectives. This chapter has argued for the adequacy of the naturalistic research approach taken by the study. The research activities were outlined as eliciting and building perspectives of users of human intermediation through iterative processes of data collection and analysis. Selecting clients of an Internet-based digital reference service for data collection may have limited the transferability of the study findings but provided an opportunity to investigate deeply the settings of users and descriptions of their situations.

Findings of the study might be limited due to the shortcomings of available methodology in capturing internal processes of humans in a *post hoc* manner. The study was an initial attempt to obtain insights into some general situations of users who make use of human intermediation. Also, the study was expected to generate new hypotheses to be tested and research questions to be explored in subsequent research built upon this one.

CHAPTER FIVE

TASKS REQUESTED OF HUMAN INTERMEDIARIES

One of the goals of the study was to develop a taxonomy of tasks requested of human intermediaries. By presenting the taxonomy, this chapter provides answers to the research question RQ1: *what kind of tasks do users request of human intermediaries?* Rather than develop a new taxonomy from scratch, an existing framework was used and refined in order to take an advantage of the cumulative nature of scientific research. The *Big 6 Model* (Appendix B1 (1)) was chosen as the initial framework, because it was acknowledged to be more flexible than other models in capturing a variety of IPS processes of different people in different settings (Eisenberg & Lowe, 1997). A sample of request messages was used to develop and refine the taxonomy, with the assumption that people had a clear idea of what they requested of AskERIC and that such an idea was reflected in the request messages. This chapter describes how such taxonomy was developed and applied in the analysis of study data, with an unexpected finding of discrepancies of requested tasks between request messages and interview data.

DEVELOPING THE TAXONOMY OF TASKS REQUESTED OF HUMAN INTERMEDIARIES

In developing the taxonomy, a sample of 500 request messages received by the AskERIC Q&A Service in April 1998 was analyzed using a top-down strategy of content analysis technique. An inductive strategy was introduced whenever the initial framework did not adequately categorize request messages. The resulting interim taxonomy (see Appendix B1 (3)) was used as a tool for a theoretical sampling of participants of the study in order to obtain a maximum variation of samples within the limitation of the study site (i.e., the AskERIC Q&A Service) from which they were recruited.

Three major problems were encountered in applying the *Big 6 Model* (Appendix B1 (1)) to categorize request messages. This led to a modification of the initial framework. The problems and solutions adopted are:

Problem 1: The term "information" is used without a clear definition in the *Big 6 Model*. On the other hand, "information" is defined as "... that which modified... knowledge structure... " (Brookes, 1980, p. 197) by those who take users' perspectives in IR/IPS research. As this takes a users' perspectives, so I considers that a message can be judged as "information" only by the recipient of the message. Using this definition, *find information within sources* (3.2) in the *Big 6 Model* may be understood as either "find metadata of sources (e.g., documents, websites, etc.) within IR systems (e.g. the Internet, the ERIC database, a library, etc.)," or "find meaning of a substantive content of sources," depending upon what searchers are looking for. Similarly, *extract information from a source* (4.2) in the *Big 6 Model* may be understood as either "extract metadata within IR systems," or "extract a meaning of a part of a substantive content of a source that is determined as 'information' by a user."

/ **Solution**: Distinguish between requests of sources and those of substantive content of information of sources by refining the model. Combine: *Determine the range of possible sources* (2.1), *Evaluate the different possible sources to determine priorities* (2.2), and *Locate sources (intellectually and physically)* (3.1) of the *Big 6 Model* to develop the category of SOURCE LOCATING TASK (TASK C of the final taxonomy). Also, combine: *Find information within sources* (3.2), *Extract information from a source* (4.2), and *Synthesis* (5) of the *Big 6 Model* to develop the category of CONTENT HANDLING TASK (TASK D of the final taxonomy).

Problem 2: "Information-seeking strategy (2)" in the *Big 6 Model* is defined as "examining alternative approaches to acquiring the appropriate information to meet defined tasks" (Eisenberg & Berkowitz, 1995, p. 22) which implies the development of a search strategy. However, two components of the category, *determine the range of possible sources* (2.1) and *evaluate the different possible sources to determine priorities* (2.2), imply that this category is focused on evaluation and selection of sources, rather than development of search strategies *per se*. Thus, there was a difficulty categorizing request messages that asked for search strategies such as directions, search steps, appropriate commands and keywords.

/ **Solution**: Develop the category of SEARCH STRATEGY (B_STR) to capture requests asking for search strategies but not for recommendation of sources.

Problem 3: "Synthesis (5)" in the Big 6 Model is defined as "integrating information drawn from a range of sources," implying that the final product of an IPS process is generated by combining extracted information from a range of external sources. Many AskERIC requests, however, sought suggestions or opinions (internal knowledge) of intermediaries on a participant's decision/action, rather than synthesized information from multiple external sources.

/ **Solution**: One's opinion can be generated by synthesizing information from multiple external sources (media, literature, people, etc.) as well as by one's own internal knowledge. Thus, a request of an intermediary's opinion can theoretically be considered as a request of synthesized information. At the same time, I recognized in analyzing request messages and interview data that the requests of extracting and synthesizing the contents of sources are rather distinctive from the requests of experts' opinions. The solution was to develop three sub-categories under the category of CONTENT HANDLING (TASK D) of the final taxonomy so as to be able to capture separately the tasks of FACT-FINDING (D1_FAC), SYNTHESIZING (D2_SYN), and OPINION-GENERATING (D3_OPI).

THE TAXONOMY OF TASKS REQUESTED OF HUMAN INTERMEDIARIES

The final taxonomy (Table 5-1) includes the following seven categories:

- **TASK DEFINITION** (A_DEF): The category is defined as "requests to provide suggestions on what to do to meet the information need" which includes requests of suggestions of topics (of papers and thesis, etc.) and IPS procedures (e.g., instructions on how to develop a particular artifact, etc.). It corresponds to task definition of the Big 6 Model.
- **SEARCH STRATEGY** (B_STR): The category is defined as "requests to provide suggestions on approaches or strategies to find information" which includes requests of instructions on how to find information, and suggestions on appropriate operations (of steps, commands, keywords, etc.). It is conceptually analogous to information seeking strategy (2) of the Big 6 Model but does not include its two components (i.e., 2.1 determines the range of possible sources; and 2.2 evaluate the different possible sources to determine priorities).
- **SOURCE LOCATING** (C): The category corresponds to Locate sources (3.1) of the Big 6 Model, but is divided into two sub-categories in order to reflect the distinction between requests for finding potential sources of relevant information and requests for physically delivering sources or for instructions on how to obtain known sources.
  - **SOURCE FINDING** (C1_LOC): This sub-category is applied to requests for intellectually locating sources and defined as "requests to identify potential sources of relevant information (including electronic, print, human, organizational, etc.) or provide metadata of these sources."

- **SOURCE OBTAINING** (C2_ACC): This sub-category is applied to requests for physically locating sources and defined as "requests to deliver or provide instructions on physically obtaining known sources including ERIC documents."

• **CONTENT HANDLING** (D): This category was developed to capture requests that ask for manipulation of contents of sources to provide information and was divided into three sub-categories to reflect different levels of manipulation.

- **FACT FINDING** (D1_FAC): This sub-category is applied to requests for extracting factual information (e.g., statistical, historical, legal or geographic data/information; mathematical/scientific formulas; definitions of concepts; contents or quotations of documents, etc.) from sources.
- **SYNTHESIZING** (D2_SYN): This sub-category is applied to requests for synthesized information obtained from multiple external sources (e.g., summary of literature on a topic, etc.).
- **OPINION-GENERATING** (D3_OPI): This sub-category is applied to requests for opinions/suggestions on a participant's decision or action.

• **EVALUATING** (E_EVA): This category is defined as "requests to evaluate IPS processes (i.e., adequacy of sources and/or search strategies)". It corresponds to *Judge the information problem solving process* (6.2) of *Evaluation* (6) of the *Big 6 Model.*

• **UNSPECIFIED TASKS** (F): The category was developed to capture requests that cannot be categorized in any of the above specific tasks due to the ambiguity of the request messages and/or the articulation of indefinable tasks in interview data.

- **AMBIGUOUS REQUEST** (F1_AMB): This sub-category applies to request messages and/or interview data that due to its ambiguity did not provide sufficient information to categorize tasks requested of intermediaries.
- **ANY/ALL TASKS** (F2_ANY): This sub-category is for requests that ask for unspecified tasks that lead to the achievement of the user's IPS goal.

• **OTHER TASKS** (G_OTH): This category was developed to capture tasks that cannot be categorized by any of the above categories. Requests that fall in this category were either questions about specific ERIC or AskERIC procedure or requests for sources of grants, promotions, etc., but not for information.

The final taxonomy was then applied to the request messages and interview data of the 62 participants of this study. The result will be presented in the next subsection.

Table 5-1: Taxonomy of Tasks Requested of Human Intermediaries

Task Type		Code	Description	Corresponding Items in Big 6*
A: TASK DEFINITION		**A_DEF**	Provide suggestions on what to do to meet the information need (e.g., clarify information need, decide/focus the topic, etc.)	1 Task definition
B: SEARCH STRATEGY		**B_STR**	Provide suggestions on approaches or strategies to find information (e.g., how to find information, which keywords to use, etc.) ⇨ If requesting "how to locate specific known documents, use **C2_acc**	2 Information-seeking strategies
C: SOURCE LOCATING	SOURCE FINDING	**C1_LOC**	Identify potential sources of relevant information (including electronic, print, human, organizational, etc.) or provide metadata of these sources. ⇨ If requesting physically sending known documents or an instruction of document delivery, use **C2_acc** ⇨ If requesting sources but not for information, use **G_oth**	2.1 Determine the range of possible sources 2.2 Evaluate the different possible sources to determine priorities 3.1 Locate sources (intellectually)
	SOURCE OBTAINING	**C2_ACC**	Deliver or provide instructions on physically obtaining known sources including ERIC documents (i.e., document delivery request; request of direct links to electronic fulltext documents; request of instruction on how to obtain known documents.)	3.1 Locate sources (physically)
D: CONTENT HANDLING	FACT FINDING	**D1_FA**	**C** Find and extract factual information or data (e.g., statistical, historical, legal or geographic information/data; mathematical/ scientific formulas; definitions of concepts; contents or quotations of documents, etc.) from sources and present it to users.	3.2 Find information within sources 4.2 Extract information from sources 5 Synthesis
	SYNTHESIZING	**D2_SY**	**N** Synthesize information obtained from multiple external sources (e.g., summary of literature on a topic) and present it to users.	
	OPINION-GENERATING	**D3_OPI**	Provide opinions/suggestions on users' decision or action.	
E: EVALUATING		**E_EVA**	Evaluate IPS processes (i. e., adequacy of sources and/or search strategies)	6.2 Judge the information problem-solving process
F: UNSPECIFIED TASKS	AMBIGUOUS REQUESTS	**F1_AMB**	Request message or interview data did not provide sufficient information to categorize the task because of ambiguity	
	ANY/ALL TASKS	**F2_ANY**	User is not expecting any particular tasks but appreciates anything that leads to achievement of his/her IPS goal.	
G: OTHER TASKS		**G_OTH**	Tasks that cannot be categorized above. This category may include request of sources but not for information and questions about specific ERIC or AskERIC operations.	

*Complete Big 6 Model is presented in Appendix B1 (1).

COMPARISON OF REQUEST MESSAGES AND INTERVIEW DATA

I recognized during data collection (i.e., telephone interview) that there were considerable discrepancies between what the original request message implied and what the participant later said in the interview had been requested of the AskERIC Q&A Service. Thus, the original request messages and the interview data were coded separately using the final taxonomy in order to identify the magnitude of discrepancies between them. An inter-coder reliability check was performed for both coding of request messages and interview data using Kappa (Cohen, 1960), and the resulting coefficients of reliability were .72 and .94 respectively.

INCONSISTENCIES OF TASKS REQUESTED BETWEEN REQUEST MESSAGES AND INTERVIEW DATA

Table 5-2 compares two distributions of task codes assigned to request messages and interview data for identical requests. In this table, the number of requests of which task codes of request messages corresponds to that of interview data are shown in bold italic.

As shown in Table 5-2, agreement of task codes between request messages and interview data was very low. A full agreement of task codes was obtained for 18 requests (29.0 %) on the sub-category level, and 24 requests (38.7 %) on the category level. The low level of agreement of task codes between the request messages and the interview data was unanticipated.

Table 5-2: Task Codes Assigned to Request Messages and Interview Data (N=62)

	Request messages														
Interview	A	B	C1	C2	D1	D2	D3	E	F1	G	C2/D1	D1/D3	D1/D3/E	D2/D3	total
B		***1***			1		1		1						4
C1			***7***		1	1	7		2						18
C2				***6***							1				7
D1		1	1		***1***		3					1			7
D2						***1***									1
D3							***1***		1						2
E															0
F2		1					2								3
G							1			***1***					2
A/C1/D1														1	1
B/C1	1	1	2		1		1								6
B/D1							1								1
C1/C2				1											1
C1/D1			1		1	1	1					1			5
C2/E													1		1
D1/D2		1		1											2
D1/D3							1								1
total	1	5	11	8	5	3	19	0	4	1	1	2	1	1	62

* Task codes agreed by both request message and interviews are in bold italic.

EXPLORATION OF POSSIBLE SOURCES OF INCONSISTENCIES

Possible explanations were explored in order to identify plausible reasons for the disagreement between request messages and interview data in terms of task requested of intermediaries.

Difficulty of Articulating Tasks in Request Messages

The phenomenon of difficulty in articulating information needs was proposed by Taylor (1962, 1968) and supported by the *ASK hypothesis* (Belkin, et al, 1982a), *sense-making theory* (Dervin & Nilan, 1986), and researchers who take a *cognitive perspective* in IR research (Ingwersen, 1992).

Three participants reported during the interview that they had difficulty wording request messages due to the ambiguity of their information needs[1]. Seven others claimed that inappropriate wording of request messages might have caused the unexpected responses they received from the AskERIC Q&A Service. Thus, at least 10 participants (16.1 %) were identified to have had problems in articulating their information needs in request messages. Among these 10, only one participant's request was assigned an identical task code for both the request message and the interview data. These results imply that the difficulty in articulating information needs, perceived by participants, was one of the major reasons for disagreement of task codes between request messages and the interview data.

Ambiguous Request Messages

The inter-coder agreement of the coefficient of reliability in terms of Kappa of the coding of the request messages was .72, which is considered to be relatively low. This low level of Kappa is in contrast to a relatively high level of Kappa (.94) obtained for the inter-coder agreement of coding of the interview data. All six coders who participated in the reliability check unanimously agreed on the difficulty of assigning task codes because of the ambiguity of the request messages. This implies that the ambiguity of request messages may be a source of disagreement of task codes between request messages and interview data.

Modification of Information Needs

One of the common theoretical premises of user-based approaches in IR and IPS research is the *modification of information needs through IR interaction* processes (Belkin, et al., 1982a; Dervin & Nilan, 1986; Bates, 1989; Katzer & Snyder, 1990; Harter, 1992). This perspective suggests that the *modification of information needs* themselves may have been the source of inconsistency between task codes assigned to request messages and interview data. Since the interview was performed 7-14 days after the AskERIC Q&A Service received participants' request messages, there was plenty of time for participants to modify their information needs. They may have reported in the interview the tasks they requested based not on the information needs at the time they wrote request messages but on the information needs at the time of the interview.

[1] Data instances are provided in Appendix D1.

Ten participants reported that their information needs were modified during the time interval between sending requests and receiving responses. The modifications were reported in one or more of the dimensions including IPS goals, the type of information needed, the topic, and the focus. Among them, only two participants had the identical task code for both the request message and the interview data (agreement = 20.0 %). This suggests the possibility that the modification of information needs may be a source of inconsistencies of task codes between request messages and interview data.

Testing the Service without Requesting Specific Task

Nineteen participants made requests not only to find information but also to test the AskERIC Q&A Service. Of these 19, 18 were first-time users of the AskERIC Q&A Service. Four of them reported in the interview that they did not have any particular tasks in mind but wanted to see how the service works. They said they were open to any responses[2]. As a result, their requests were coded as either UNSPECIFIED TASK (F2_ANY) or received multiple task codes. This suggests that participants who had no experience of using the service might have written their own IPS goals, rather than specific tasks. This idea was explored by comparing participants' experience in using the service with the agreement of task codes between their request messages and interview data. The result is presented in Table 5-3.

As shown in Table 5-3, not much difference was observed between participants who had experience in using the AskERIC Q&A Service and those who had no experience. This suggests that experience in using the service was not a source of inconsistency of task codes between request messages and interview data. A similar analysis was performed for the 19 participants who had the common goal of testing the service, and found that agreement of task codes between request messages and interview data was achieved for about a quarter of them. This suggests that the participants' *experience in using the service* and their common goal of *testing the service* were not the major sources of inconsistency of task codes between request messages and interview data.

Table 5-3: Experience in Using the AskERIC Q&A Service and Agreement of Task Codes Between Request Messages and Interview Data (N=62)

Experience in Using the AskERIC Q&A Service	Agreement of Task Codes Between Request Messages and Interview Data		
	Agree	Disagree	Total
Yes	5 (26.3 %)	14 (73.7 %)	19 (100.0 %)
No	13 (30.2 %)	30 (69.8 %)	43 (100.0 %)
Total	18 (29.0 %)	44 (71.0 %)	62 (100.0 %)

[2] Data instances are provided in Appendix D2.

Short Nature of Request Messages

Many of the request messages were very short. The two shortest request messages consisted of only 8 words, the longest, of 310 words. The mean length was 41 words and the median was 27. Examples of short, medium, and long request messages are presented in Appendix D3. The idea that the short nature of request messages might have caused discrepancies of task codes between request messages and interview data was considered. A possible association between the length of request messages and inconsistencies of task codes between request messages and interview data was explored. Request messages were divided into three groups in terms of word count, and ratio of the number of participants whose task codes agreed between request messages and interview data was calculated for each group. The result of the analysis is presented in Table 5-4.

As shown in Table 5-4, not much difference was observed among the three groups, even though participants who sent long (41 or more words) request messages had a somewhat higher level of agreement. This suggests that the length of request messages was not a major source of discrepancy of task codes assigned to request messages and interview data.

Table 5-4: Length of request Messages and Agreement of Task Codes Between Request Messages and Interview Data (N-62)

Length of Request Message (word count)	Agreement of Task Codes Between Request Messages and Interview Data		
	Agree	Disagree	Total
Short (1-20 words)	5 (26.3 %)	14 (73.7 %)	19 (100.0 %)
Medium (21-40 words)	7 (25.0 %)	21 (75.0 %)	28 (100.0 %)
Long (41 or more words)	6 (40.0 %)	9 (60.0 %)	15 (100.0 %)
Total	18 (29.0 %)	44 (71.0 %)	62 (100.0 %)

PLAUSIBLE REASONS FOR INCONSISTENCIES

As a result of exploratory analysis, the following three sources are therefore suggested as likely reasons for the low level of agreement of task codes assigned to the request messages and to the interview data.

(1) difficulty of articulating tasks in request messages,
(2) ambiguous request messages, and
(3) modification of information needs in the interim between request and interview.

Thus, the initial assumptions made by the study that people had clear ideas of what they requested of intermediaries and that such ideas ought to be reflected in request messages were proven wrong. Among the above three plausible reasons for the disagreement, the first two are related to the lack of interaction in the question negotiation of digital reference services (Lankes, 1998; White, 1999).

In the telephone interview, support for the inclusion of interactivity in the question-negotiation was suggested by three participants. All of these three had inconsistencies of task codes between request messages and interview data, and they evaluated negatively the responses they received from AskERIC. On the other hand, four participants reported that they had interactions with the AskERIC intermediaries before receiving the final responses, and they evaluated the final responses they received from the service as perfect. These contrasting cases suggest the significance of interactions in achieving a high level of common understanding of information needs between users and intermediaries.

Perhaps the telephone interview performed in the data collection of this study could be considered analogous to interaction in the question-negotiation processes, because it elicited participants' information needs as well as relevant situational factors in the participants' IPS processes of the requests[3]. Assuming that the analogy is real, the different levels of the reliability of inter-coder agreement of task codes between request messages and interview data in the study may demonstrate the different levels of performance between the question negotiation processes without interaction and those with interaction. If so, this finding suggests the significance of interaction in question negotiation processes for achieving a high level of common understanding of tasks requested of intermediaries between a user and an intermediary.

The above analysis also suggests that the initial research design of categorizing requests based solely on request messages was inexpedient. Hence, request messages need much clarification through interaction to achieve a good understanding of the tasks that requesters want performed for them. As a result, the initial research design was modified and tasks requested of AskERIC as captured in the interviews rather than in the request messages were used for the later analysis of patterns of associations between situational factors and tasks requested of human intermediaries, which will be discussed in Chapter 9.

SUMMARY

This chapter reported study findings on tasks requested of the AskERIC Q&A Service and provided answers to the research question RQ1: *what kind of tasks do users request of human intermediaries?* The taxonomy of tasks requested of human intermediaries was developed based on the analysis of a sample of past request messages received by AskERIC. The taxonomy was applied in the analysis of 62 participants' request messages and interview data.

Considerable discrepancies were identified between tasks codes assigned to request messages and interview data of identical requests, that led to an exploratory analysis in search for sources of inconsistencies between them. Three plausible reasons for such discrepancies were (1) difficulty of articulating tasks in request messages,

[3] I admit that the interview was different from question-negotiation in terms of time intervals and sequences, while an interactive question negotiation typically occurs as soon as a user asks a question or submits a request; the interview was performed 7-14 days afterwards. In addition, interactive question negotiation is usually performed before a user receives a response from an intermediary, while the interview was performed after they received it.

(2) ambiguous request messages, and (3) modification of information need between the time of sending request messages and the time of telephone interview. First two reasons are related to lack of interaction in question negotiation processes generally observed among DRSs. This finding implies the significance of interaction between users and intermediaries in question negotiation processes to achieve a high level of common understanding of users' information needs. The final taxonomy of tasks requested of human intermediaries is not very reliable for categorizing tasks based on the analysis of one-shot request messages, but likely to be reliable when highly interactive question negotiation is performed.

CHAPTER SIX

SITUATIONAL FACTORS ASSOCIATED WITH THE USE OF HUMAN INTERMEDIATION

This chapter reports the study's findings regarding situational factors associated with the use of the AskERIC Q&A Service and answers the research question RQ2: *what situational factors do users perceive to be salient when they make requests of human intermediaries?* Four dimensions of information needs including user goals, types of information sought, perceived importance of obtaining information, and user biases in information needs, as well as the modification of information needs, are described with patterns of association among them. Three factors associated with the generation of users' IPS goals are described and discussed with their relation to time pressure and participants' freedom in IPS processes. These factors are compared with artifacts developments in order to identify relationships between them. Two variables of social functions, namely "capacity" and "role" in IPS are discussed with their relationship with participants' IPS goals. Relations between "role" and information sharing are analyzed in order to identify patterns of associations between them.

INFORMATION NEEDS

Information needs are considered as the major motivational thrust in generating human information behavior (Wilson, 1981, 1999; Dervin & Nilan, 1986, Taylor, 1986; Marchionini, 1995). In this study, information needs are considered to be situational in two ways: (1) different information needs generate different requests; (2) information needs may be modified during an IPS process (Taylor, 1962, 1968; Belkin & Oddy, 1982a, 1982b; Spink & Greisdorf, 1998; Wilson, 1999; Xie, 1997). Thus, it should be important to identify major characteristics of information needs that were associated with participants' uses of the AskERIC Q&A Service.

This section describes four dimensions of information needs. They are: (1) user goals, (2) types of information sought, (3) perceived importance of obtaining information, and (4) user biases in information needs.

In the following, four dimension of information needs will be elaborated on and described with patterns of associations observed within the dimension and between dimensions. *User goals* will be described on multiple levels in an effort to integrate the *goal model* of Bandura's (1989) *social cognitive theory* into the IPS processes. The factor of *type of information sought* will be compared with *user goals*. Perceived *importance of obtaining the information* will be related to reasons for importance. The factor of user biases in information needs will be compared with user goals. Patterns of modifications in information needs during participants' IPS processes are also reported.

MULTIPLE LEVELS OF USER GOALS

During the preliminary analysis of the interview data (inter-category integration), I noticed that participants articulated their goals in multiple levels. This recognition fits well with Bandura's (1989) *goal model* in his *social cognitive theory* that makes a distinction between distal goals and proximal subgoals in which the former "serve as general directive function" and the latter "determine people's immediate choice of activities (p. 473-474). Also the tasks some participants requested of the AskERIC Q&A Service seemed to be a whole or a part of what they intended to accomplish through the use of the service. This recognition suggested that the analysis of user goals be done at multiple levels and a comparison of the lower-level goals with tasks requested of AskERIC might provide a better understanding of relationships between participants' information needs and tasks they requested of AskERIC.

Based on the above, this study operationally defined *user goals* on the following three levels:

(1) **Goals of using the AskERIC Q&A Service**: what participants intended to accomplish through the use of The AskERIC Q&A Service;
(2) **IPS goals**: what participants intended to accomplish through the IPS process; and
(3) **Higher-level goals**: what participants intended to accomplish by fulfilling IPS goals.

Each participant's goals were extracted and categorized into three levels defined above. For example, participant P5 was looking for possible places that would give grants (*goal of using AskERIC*) in order to write and submit the grant proposal (*IPS goal*) so as to be able to get grant funded (*higher-level goal*). Summaries of descriptions of each level of goals of the individual participant are presented in Appendix C1. I further compared these descriptions of *user goals* between participants in order to find patterns among them. The result is presented in Table 6-1. In this table, participants' IPS goals are grouped into eight broad categories. Similar goals of using the AskERIC Q&A Service are grouped together and listed under each of the *IPS goals* with participant ID numbers.

Table 6-1: Participants' Goals in Multiple Levels (N=62)

IPS Goal Category	IPS Goal	Goal of Using The AskERIC Q&A Service	Participant ID
DEGREE SEEKING : attain a degree, fulfill course requirements, get good grade.	A Conduct research and/or write paper/thesis as a course/degree requirement.	a Decide topic of research/paper	P41 P50 P53
		b Find/obtain sources of information *relevant* to the topic of class assignment	P2 P13 P27 P35 P45 P47 P51 P55 P59 P62 P65
		c Obtain known ERIC documents	P25 P36 P42 P48 P49
		d Identify ED number of an ERIC digest to use it in citation.	P9
		e Find statistical formula/data to used it in designing research	P11 P12
	B Develop a lesson plan as a course requirement.	Find/obtain lesson plans developed by others	P58
	C Do reading assignment for a class.	Locate/obtain known sources	P29
	Common goals	*Test the AskERIC Q&A Service*	P12 P33 P42 P43 P53P58 P59
		Learn how to use The AskERIC Q&A Service to find information	P18 P33 P49
		Verify own search process/result	P23 P43 P48
DECISION/ACTION PLANNING: make own decision or influence/ protest others' decision.	A Enhance own knowledge to be able to make decision or to take action.	Find/obtain sources of information relevant to the topic of decision/actin.	P1 P4 P6 P7 P10 P17 P19 P20
	B Respond to or convince stakeholders.	Find factual data that support/ invalidate a decision/ action	P8 P24 P26 P28 P52 P57 P60 P64
	C Influence/protest decision/action of others.	Get experts' opinions on a decision/action	P15; P22; P34
	Common goals	*Test the AskERIC Q&A Service*	P7 P15 P17 P22 P28
		Verify own search process/result	P60
TEACHING: be prepared to teach classes, help students learn.	A Design a lesson plan by incorporating existing lesson plans or ideas.	Find/obtain lesson plans developed by others	P21; P32; P46; P63
	B Design or select materials to prepare for courses.	a Find/obtain teaching materials	P16; P31
		b Get permission to use sources as teaching materials	P38
	Common goals	*Test the AskERIC Q&A Service*	P16 P31
		Learn how to use system/service	P21
MARKETING: sell products.	A Send promotional materials to potential customers.	a Find/obtain data on potential customers	P3; P5
	B Find potential sales channels	b Find Internet sites to promote a book	P56
	Common goal	*Test the AskERIC Q&A Service*	P54 P56
GRANT SEEKING: get grant funded.	Write/submit grant proposal.	Find potential sources of grant	P5
CAREER ENHANCING: get recruited	Prepare for job interview.	Find/obtain sources of information (background for discussion)	P14
	Common goal	*Test the AskERIC Q&A Service*	P14
RESEARCH: conduct research & publish it	Write report/ hold workshop	*Find/obtain sources of information relevant to the topic of research.*	P30
PRESENTATION: do a presentation	Prepare for a presentation.	Find facts appeal to the audience	P44
	Common goal	*Test the AskERIC Q&A Service*	P44

As shown in Table 6-1, some goals of using the AskERIC Q&A Service are unique to a particular category of IPS goal, while some goals of using the service are common among multiple categories of IPS goals that are shown in italics in the table. For example, goals of "deciding a topic of research/paper" and "obtaining known documents" are identified only under the DEGREE SEEKING goal. Similarly, goals of "find factual data that support/invalidate a decision/action" and "get experts' opinions on a decision/action" are identified only under the DECISION/ACTION PLANNING goal. Thus, these goals are considered as unique to each category.

On the other hand, three goals of using the AskERIC Q&A Service are identified as common goals:

(1) Test the AskERIC Q&A Service,
(2) Learn how to use the system/service, and
(3) Verify own search process/result.

Further analysis of interview data identified that (1) *test the AskERIC Q&A Service* was unique to those participants who had no experience of using the service, (2) *learn how to use the system/service* was unique to those participants who had a low level of perceived IPS skill, and (3) *verify own search process/result* was unique to those who did self-searching before sending requests, had experience in using the service, and had a high level of perceived IPS skill. Details of these findings will be reported later.

TYPE OF INFORMATION SOUGHT

Participants articulated during the interview what type of information they were looking for when they made requests of the AskERIC Q&A Service. In many cases, however, participants described the types of information they sought as compared to what they received from AskERIC, in response to interview question Q19[1]. The type of information a participant sought did not always coincide with the type of information they requested[2]. For example, participant P9 requested a known ERIC digest, but what she wanted was the ED number of the digest that she intended to use as a part of a citation of a paper. The contradiction between what users wanted and what they requested of librarians is a widely recognized phenomenon in traditional library reference services in face-to-face settings (Taylor, 1962, 1968; Edmonds & Sutton, 1991; Michell & Dewdney, 1998). The above finding suggests that the same phenomenon can be observed among users of the AskERIC Q&A Service – a digital reference service (DRS).

The types of information participants were actually looking for were categorized into seven groups and compared with the three categories of IPS goal (Table 6-2).

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[1] Interview question Q19 asked, "Please describe to me what you received from AskERIC." Probe question used to elicit what they wanted was, "Was it what you requested?" [If answer is negative, ask] "Why?"

[2] The data instances are provided in Appendix D4.

Table 6-2: Types of Information Sought and IPS Goal Category (N=62)

Type of Information Sought	IPS Goal Category				
	DEGREE SEEKING	DECISION/ ACTION PLANNING	TEACHING	Other*	Total
Source (website, databases, journal articles, books, research reports, organizations, ERIC documents)	**21 (75.0 %)**	**6 (30.0 %)**	**2 (28.6 %)**	4 (57.1 %)	33 (53.2 %)
Fact (time frame, procedure, interpretation of law, concrete evidence, definition of terms)	0	**9 (45.0 %)**	1 (14.3 %)	2 (28.6 %)	12 (19.4 %)
Data (statistical data (statistics, formula,), metadata of documents)	3 (10.7 %)	2 (10.0 %)	0	1 (14.3 %)	6 (9.7 %)
Lesson Plan	1 (0.4 %)	0	**4 (57.1%)**	0	5 (8.1 %)
Anything (any type of information on the topic)	3 (10.7 %)	0	0	0	3 (4.8 %)
Expert opinion	0	2 (10.0 %)	0	0	2 (3.2 %)
Contents (contents of documents)	0	1 (5.0 %)	0	0	1 (1.6 %)
Total	28 (100.0 %)	20 (100.0 %)	7 (100.0 %)	7 (100.0 %)	62 (100.0 %)

"Other" category of goal includes marketing, grant seeking, career enhancing, presentation, and research.

As shown in Table 6-2, the following patterns of associations are observed in the types of information sought and the three IPS goal categories:

- Participants with a DEGREE-SEEKING goal tended to look for sources such as articles, books, and ERIC documents in order to write papers or the literature review of thesis.
- Participants with the DECISION/ACTION PLANNING goal tended to look for facts and sources to be used as evidence in order to support/reject a decision/action.
- Participants with the TEACHING goal tended to seek lesson plans and teaching materials. K-12 teachers tended to look for lesson plans to be used in designing their own lessons, and college/university faculty members tended to look for sources to be used as teaching materials.

Based on the above, participants' IPS goals tend to be associated with the types of information they sought.

INTENSITY OF INFORMATION NEEDS

In response to Q6 of the telephone interview[3], all 62 participants provided their perceived level of importance of obtaining the information they were looking for on a scale of 1 to 10 with 1 as least important, 5 as average,

[3] The question Q6 of the telephone interview asked, "With 1 as least important, 5 as average, and 10 as very important, how important was it for you to find the information you were looking for?"

Table 6-3: Importance of Finding Information and Reasons (N=62)

Reasons	Score	1	2	3	4	5	6	7	8	9	10	Median
Goal-related Reasons	Goal is important										12	10
	The information is critical for attaining the goal							1	1		11	10
	Need to do comprehensive literature review										1	10
	Best way to attain the goal										2	10
	Need to dispute										1	10
	Class/course requirement								1	1	1	9
	Information makes it easier to achieve the goal								1			8
	Information helps make own argument								1			8
	Information is supplementary for achieving the goal					4	2	2	1			6
	Background information							1				7
Time-related Reasons	Time pressure										1	10
	Time saving										1	10
	Personal deadline									1		9
	Not immediately pressing						1					6
IPS process-related Reasons	Exhausted sources							1			3	10
	Initial trial							1	1			7.5
	Need a comprehensive search										1	10
	Alternative sources are available to find information							1	1			7.5
	Logistic information						1					6
	No intention to use information	1*										1
Job-related Reasons	New to the job										1	10
	Job responsibility							1			1	8.5
Personal Reasons	Personally interested								3		1	8
Other Reasons	Need accurate information									1		9
	Question need to be answered										1	10
	Decision/action should be research-based									1		9
	No specific reason						1					6

* The participant gave score of "0" but I interpreted as 1, because that is the lowest score available in the instrument.

and 10 as very important. Most of the participants articulated their reasons for reporting a specific score either voluntarily or by responding to a probe question (i.e., "Why?"). Similar reasons were grouped together and compared with the score of importance. The result is presented in Table 6-3.

Some participants gave multiple reasons for giving a particular score. Thus, these reasons are not mutually exclusive. Even though it was assumed that the same score provided by different participants did not necessarily refer to the same level of importance, the distribution of reasons and median scores of each reason imply the following:

- **Goal-related reasons**: A great majority of participants (44 or 71.0 %) gave reasons for providing a particular score as related to their IPS goals. Participants tended to perceive it to be very important to obtain the information when they thought the IPS goal was important and the information was critical to attain the goal. On the other hand, participants tended to perceive it to be not very important when the information they sought was supplemental to attain the goal.
- **Time-related reasons**: Four participants (6.5 %) gave time-related reasons for providing a particular score. Participants tended to perceive it to be important to obtain the information when they were under time pressure and wanted to save time. However, they tended to perceive it to be not very important when the information was not immediately needed.
- **IPS process-related reasons**: Eleven participants (17.8 %) gave reasons related to their IPS processes. Participants tended to perceive it to be very important to obtain the information they sought when they had exhausted available sources. However, they tended to perceive it to be not very important when their use of the AskERIC Q&A Service was the initial step to look for the information, and when they knew that alternative sources were available.

Based on the above, the perceived importance of finding information tends to be associated with IPS goals, time concerns, and IPS processes. For instance, one participant who was asked by her instructor to send a request to AskERIC using an impromptu information need during a class lab session said it was not at all important for her to obtain the information and gave a score of one[4], because she herself had no intention of using that information. Another participant in a similar setting said it was very important for her to obtain the information and gave it a score of 10, because she was required to submit the AskERIC response to the instructor as a basis for her grade. These two contrasting cases suggest that the existence and/or importance of higher-level goals tend to be associated with the user's perceived level of importance in obtaining the information.

[4] The participants gave the score "zero" but I interpret it as "one" which is the lowest score available in the scale.

PRETENDED RATIONALITY – A SOURCE OF USER BIASES IN INFORMATION NEEDS

This research identified inherent biases in seven participants' information needs. They had anchored their opinions on the problems or issues of their interests before they made requests of the AskERIC Q&A Service and sought only those pieces of information (facts, research findings, and/or experts' opinions) that supported their contentions[5].

I named the motivation behind such biased information needs as "pretended rationality," in which participants tried to find information that supports their opinions. This is because they considered research-based information a powerful weapon that would help persuade other people who had different opinions and consequently exert influence on decisions and/or actions. However, the opinions themselves were not necessarily rational because they were not based on research findings. In other words, participants developed their opinions or made decisions based on personal merits or other subjective reasons, but pretended as if their opinion were rational by using research findings or experts' opinions as supporting evidence.

Among seven participants who made requests based on biased information needs, six were identified as having the DECISION/ACTION PLANNING goal. Thus, biases in information needs and "pretended rationality" behind them seem to be a peculiar characteristic of IPS for the DECISION/ACTION PLANNING goal.

MODIFICATION OF INFORMATION NEEDS

This study captured modification in different aspects of information needs in 23 participants' IPS processes. Through constant comparative analysis of interview data, the study identified following patterns of modifications on different levels of user goals.

- Change of user goals on both levels at the time of encountering the AskERIC Q&A Service in self-searching on the Internet (deactivation of current IPS goals and activation of new IPS goals).
- Addition of new IPS goals at the time of receiving partially relevant information from AskERIC (activation of new IPS goals in addition to current IPS goals).
- Abandonment of the immediate sub-goals and generation of new sub-goals in order to fulfill imposed IPS goals.
- Abandonment or deactivation of both immediate and IPS goals at the time when users receive irrelevant or null information from AskERIC.

[5] Examples of data instances are provided in Appendix D5.

Modifications were also identified on aspects of information needs:

- Change in topic of the search when users cannot find enough information on the current topic in self-searching or by using the AskERIC Q&A Service.
- Change in the type of information needed (e.g., aggregated statistical data => data from small-scale case studies; abstracts of research papers => experts' opinions) at the time when they received irrelevant, null, or overwhelming amount of information from AskERIC.
- Increase in focus of information needs through self-searching and/or browsing information obtained from AskERIC.
- Increase in intensity of information needs through self-searching.
- Change in strategy (e.g., format of reference in a paper, statistical procedure to be used in research, strategy to obtain fulltext documents, use existing lesson plans => develop new lesson plans, etc.) as a result of unsuccessful self-searching and/or irrelevant or null information obtained from AskERIC.

Researchers in user-based IR and IPS research have assumed that users' information needs might be modified through IR interaction, and their findings and models captured some such modifications (Oddy, 1977; Xie, 1997). However, none of them provide a clear definition of "modification of information needs." In addition, existing findings or models concerning "modification of information needs" have yet to capture a variety of patterns of modifications as exemplified above. Incorporation of the concept of multiple levels of goals of Bandura's (1986) *goal model* of *social cognitive theory* enabled this research to take a step forward to fill that gap.

It should be noted that in many instances participants modified their goals or information needs, they tended to take the easier path from among available alternatives. For example, participants who were looking for a topic for a paper tended to choose an easier topic in terms of availability of relevant sources. Similarly, a participant who was looking for a statistical formula changed statistical methods to a familiar one so as to be able to finish writing a research proposal. In that sense, these findings support Poole's (1985) "least effort principle" operating in IPS processes.

GENERATION OF IPS GOAL

Provided that human IPS activities are goal-oriented, IPS processes themselves can be considered as structured by the user goals. At the same time, processes by how such goals were generated may also be associated with participants' IPS behavior. Based on this premise, this research pursued situational factors associated with generation of participants' IPS goals.

FACTORS ASSOCIATED WITH GENERATION OF INFORMATION NEEDS

Three factors were identified as associated with the generation of participants' IPS goals. They are: (1) *imposition*, (2) *social influence*, and (3) *personal interests*. This section first discusses these three *goal-generating factors* and how they were associated with participants' *IPS goals*. Then, findings of associations between these factors and other situational factors are described.

Imposition of User Goals

Gross (1995) proposed that IPS behavior would be different when "people are seeking information not because they have identified an information need themselves, but because they have been set on that course by another," and called this situation an "imposed query" (p. 236).

In this study, imposition was identified on three levels:

- **Imposition of IPS goal**: A majority of participants (45 or 72.6 %) were given the IPS goals by other people. For example, participants whose capacity was college or university students were given class assignments (e.g., a paper, research, a presentation, a reading assignment, etc.) by the instructor or were required to write a thesis in order to attain a degree or course credit. Others were required to conduct IPS activities by the boss and/or as their job assignments.
- **Imposition of information source**: Three participants (4.8 %) were required by the instructor to use the AskERIC Q&A Service as a class/course assignment. Among them, two were requested by the instructor to send requests to AskERIC during a class (lab), and one was required to write a term paper by using the AskERIC Q&A Service to find information. In addition, two participants were required by the instructor to use the ERIC database on the AskERIC website to find information for class assignments and ended up using the Q&A Service.
- **Imposition of the topic of IPS**: Two participants whose capacity was student sent requests on the topic prepared by the instructor.

All together, a great majority of participants (46 or 74.2 %) had their goals imposed on one or more of these three levels.

Social Influences in Generating User Goal

Even when participants reported they generated their information needs by themselves, some of them had IPS goals influenced by other people. For example, one participant made a request of AskERIC concerning the approximate time interval between submission of a written request and physical assessment of the individualized education program (IEP) in order to help a mother of a severely disabled child in her support group voluntarily. Another participant, a high school teacher, sought research-based evidence that supports her contention that the late school starting time was detrimental to high school students in order to exert

influence on the county's decision to change the school starting time. Her IPS goal was generated by influences of the county's plan as well as by other teachers, because she said she started searching for the information when she heard a rumor from other teachers in her school that opponents obtained research-based evidence to support their contention[6]. All in all, seven participants' (11.3 %) were identified as their *IPS goals* generated by *social influence*.

Personal Interests in Generating User Goal

Nine participants (14.5 %) were identified as seeking information based on self-generated *IPS goals* that were free from imposition and/or other people's influence. For example, one participant who recently had been diagnosed as dissociated identity disorder (DID) made a request of AskERIC for information about the relation between DID and learning disability (LD) so as to understand more about her own learning problems for the purpose of waiving math requirements. Another participant made a request on an appropriate procedure to clean a baby's ears, as well as the reason why Q-tips should not be used, in order to make sure that he was not damaging his daughter's well being[7].

In a sense, imposition can be considered as a special type of social influence, because human imposers determine users' IPS goals. Thus, the above findings indicate that only nine or 14.5 % of participants' goals were cognitively generated by the participants' own interests. Thus, a relatively small number of participants had internally generated goals. This finding indicates the significance of social situations in human IPS behavior.

GOAL-GENERATING FACTORS AND GOAL TYPE

Table 6-4 presents association between three categories of *IPS goal* and three *goal-generation factors*.

As shown in Table 6-4, all participants with either the DEGREE SEEKING goal or the TEACHING goal had their goal imposed. Participants whose *capacity* was student had their IPS goals imposed by instructors or

Table 6-4: Association between Goal-Generating Factors and IPS Goal Category (N=62)

IPS Goal Category	Goal-Generating Factor			
	Imposition	Social Influence	Personal Interest	Total
DEGREE SEEKING	**28 (100.0 %)**	0	0	28 (100.0 %)
DECISION/ACTION PLANNING	6 (30.0 %)	**8 (40.0 %)**	6 (30.0 %)	20 (100.0 %)
TEACHING	**7 (100.0 %)**	0	0	7 (100.0 %)
Other	4 (57.1 %)	0	3 (42.9 %)	7 (100.0 %)
Total	45 (72.5 %)	8 (12.9 %)	9 (14.5 %)	62 (100.0 %)

[6] Examples of data instances are provided in Appendix D6

[7] Examples of data instances are provided in Appendix D7.

academic programs that offer degrees. Participants whose *capacity* was K-12 teacher or college/university faculty member were required by their job assignments to teach particular classes and/or courses. Hence their IPS goals of preparing for these courses are imposed. Some participants are required by their boss and/or job responsibility to prepare for particular decisions/actions. All six participants with imposed DECISION/ACTION PLANNING goals identified themselves as collaborators on the IPS projects. They reported that other members who took part in the collaborated IPS processes imposed their IPS goals on them.

Social influence, on the other hand, seems to be a unique factor for the DECISION/ACTION PLANNING goal. Participants with this IPS goal were voluntarily involved in decision/ action-planning activities by experiencing social influence from other people or organizational bodies, and pursued their IPS goals in order to protect their own job territories or shared interests of groups to which they belonged.

Personal interest also seems to be a unique factor that generated the DECISION/ACTION PLANNING goal. Different from those who had a socially generated DECISION/ACTION PLANNING goal, participants' decision and/or action were concerned with their personal/family problems.

IMPOSITION OF IPS GOAL AND DEADLINE

Table 6-5 presents three goal-generating factors and the deadline of IPS processes.

Table 6-5: Association between Goal-Generating Factors and Deadline (N=62)

Goal-generating Factor	Deadline			
	Imposed deadline	Self-set deadline	No deadline	Total
Imposition	**33 (73.3 %)**	3 (6.7 %)	9 (20.0 %)	45 (100.0 %)
Social influence	2 (25.0)	1 (12.5 %)	**5 (62.5 %)**	8 (100.0 %)
Personal interests	1 (11.1 %)	2 (22.2 %)	**6 (66.7 %)**	9 (100.0 %)
Total	36 (58.1 %)	6 (9.7 %)	20 (32.3 %)	62 (100.0 %)

As shown in Table 6-5, 33 or 73.3 % of participants whose IPS goals were imposed also had an imposed deadline, while the majority of participants who had goals generated by *social influences* and/or *personal interests* did not have any deadline for their IPS. This finding suggests that there is an association between *imposition of IPS goals* and a *deadline*. Deadlines were found to be associated with *perceived time pressure*, and perceived time pressure was also found to be associated with *negative emotion* (e.g., frustration) in self-searching (see Chapter 7 under "Time Factors in Self-Searching"). Thus, the data suggest that the imposition of IPS goals should have a significant impact on human IPS processes.

GOAL-GENERATING FACTORS AND DEVELOPMENT OF ARTIFACTS

Participants took different avenues depending upon what they received (or did not receive) from AskERIC, as well as what they found in other information sources. Many participants who obtained required information to complete their IPS goals by the time of the interview used or planned to use the information in developing artifacts. On the other hand, participants with IPS goals generated by their own interests seem to have completed their IPS goals at the time when they obtained relevant information from AskERIC or any other sources.

Forty-four participants (71.0 %) developed or planned to develop artifacts based on what they found in their IPS processes. Table 6-6 presents types of artifacts they developed or planned to develop.

Table 6-6: Type of Artifacts Developed (N=62)

Type of Artifact	Status of Artifacts Development		
	Completed	Planed	Total
Paper/thesis/report	8	17	25 (40.3 %)
Lesson plan	4	1	5 (8.1 %)
Presentation/seminar	1	3	4 (6.5 %)
Other*	8	2	10 (16.1 %)
None	18		18 (29.0 %)
Total			62 (100.0 %)

* 'Other' category includes course pack (1); grant proposal (1); letter (1); library handbook (1); list of websites (1); mailing list (1); spreadsheet (1); syllabus (1); a package (1); and search result (1)

The participants' *goal-generating factors* were compared with whether they developed (or planned to develop) artifacts. The result is presented in Table 6-7.

Table 6-7: Association Between Goal Generating Factors and Artifact Development (N=62)

Goal Generating Factor	Artifact Development		
	Yes	No	Total
Imposition	40 (88.9 %)	5 (11.1 %)	45 (100.0 %)
Social Influence	3 (37.5 %)	5 (62.5 %)	8 (100.0 %)
Personal Interest	1 (11.1 %)	8 (8.8.9 %)	9 (100.0 %)
Total	4471.0 %)	18 (29.0 %)	62 (100.0 %)

As shown in Table 6-7, participants with imposed IPS goals tended to develop artifacts, as suggested by Gross (1995). On the other hand, participants with IPS goals generated by social influence and personal interests tended not to develop any artifacts.

GOAL-GENERATING FACTORS AND STABILITY OF IPS PROCESS

Three goal-generating factors discussed above seem to be associated with the stability of IPS processes. This section discusses relationship between goal-generating factors and degree of freedom participants had in IPS processes as well as modifications in multiple levels of goals.

Goal-Generating Factors and Degree of Freedom in IPS Processes

The *imposition of IPS goals* seems to have limited the amount of control participants maintained in their IPS processes. When participants had imposed IPS goals, they still maintained the freedom of choosing information sources/channels, selecting the topic of the search within the limitation of the domain or scope of the class they were taking/teaching and of the job assignment. But they were also likely to have an *imposed deadline* for the IPS, which may be associated with *perceived time-pressure* and frustration during the IPS process. When the use of particular sources (e.g., ERIC database, the AskERIC Q&A Service, etc.) for the IPS was imposed, participants would have no choice in selecting information sources/channels, but still would maintain freedom of choosing a topic of the search. When both the IPS goal and the topic were imposed, participants would not have much freedom in the IPS processes even though they might have freedom in selecting information sources/channels. When imposition was made on all three levels, the participants would hardly maintain any freedom in the IPS processes. Thus, the *imposition* of any level would decrease the degree of freedom participants had in their IPS processes to a greater or lesser extent.

Social influence on the IPS goals also seems to have limited participants' freedom in their IPS processes. When participants had socially generated IPS goals, such as resolving conflicts, influencing other parties' decisions, or planning cooperative actions, these goals may have limited the topic of the search. In addition, socially generated IPS goals may also have been accompanied with an *imposed deadline*, particularly when social contexts involved collaborative decision-making or action-taking.

Only those participants who had internally generated IPS goals of fulfilling personal interests or family-related problem-solving/action-planning would have a high degree of freedom in their IPS processes, since they had complete freedom of choices of topic and sources/channels and generally did not have any imposed deadline.

As reported above, a great majority of participants of this study had their IPS goals either imposed or socially generated. Thus, the findings of this study should reflect the limited degree of freedom they had in their IPS processes.

Goal-Generating Factors and Modification of User Goals

The limitation of the degree of freedom participants had in their IPS processes seems to be directly related to the possible modifications they made on their IPS goals. Through constant comparative analysis of interview data, the study identified the following patterns of relationships between goal-generating factors and modification of participants' goals.

- Five participants who had imposed IPS goals with a very close deadline (within a week from making the requests) abandoned their initial goal of using the AskERIC Q&A Service at the time when they received null or irrelevant information from AskERIC. They used information at hand or own knowledge to accomplish their IPS goals in time.
- Six participants who had imposed IPS goals with relatively distant deadline (one month or more from making the requests) modified their initial goal of using the AskERIC Q&A Service together with other dimensions of information needs, such as topic of the search or type of information sought, at the time when they received irrelevant or partially relevant information from AskERIC. They continued searching for information by making new requests to AskERIC or by self-searching of other sources in order to complete their IPS processes. One of them added a new IPS goal when he received information partially relevant to the initial information needs but included sources useful for the newly activated IPS goal.
- Two participants who had IPS goals generated by personal interests and had no imposed deadline abandoned or deactivated their IPS goals when they received irrelevant information from AskERIC. One of them reported that she obtained needed information at a later time unexpectedly.
- Three participants who encountered the AskERIC Q&A Service switched their IPS goals and made requests of AskERIC based on suddenly activated information needs for different IPS goals.

Patterns of modification of user goals described above imply that the stability of IPS goals is related to goal-generating factors in the following ways:

- Users with imposed IPS goals are likely to maintain them by modifying or abandoning lower level immediate goals.
- Users with personally generated IPS goals are likely to abandon or deactivate their IPS goals when relevant information is not available easily.
- Abandoned personally generated IPS goals may be activated when users encounter relevant information unexpectedly.

Above findings suggests that imposition and social influence in generating user goals are closely related to modification of user goals or information needs.

SOCIAL FUNCTION IN IPS PROCESS

Two variables of social functions, *capacity* and *role* in a particular IPS process, were identified as associated with participants' *IPS goals*. Assuming that one person may take several different functions in everyday life – a teacher, a student, a parent – at a different time for a different task, Q30[8] of the telephone interview elicited each participant's *capacity* for the particular IPS process that generated the particular requests captured in the study. Participants' *roles*, on the other hand, were defined based on whether they were *originator*, *collaborator*, or *proxy* in the IPS process, and were elicited by interview question Q2[9]. This section describes associations identified between participants' *IPS goals* and their *capacity* and *role*.

CAPACITY IN IPS PROCESS

Table 6-8 compares participants' primary occupation with their *capacity* in the IPS processes captured in the study.

Table 6-8: Occupation and Capacity (N=62)

	Capacity in IPS Process							
Primary Occupation	K-12 teacher	Faculty	Admin./Manager	Librarian	Student	Parent	Other**	Total
K-12 teacher	7 (33.3 %)				13 (61.9 %)	1 (4.8 %)		21 (100.0%)
Faculty		4 (66.7 %)			2 (33.3 %)			6 (100.0%)
Admin./manager			5 (50.0 %)		4 (40.0 %)	1 (10.0 %)		10 (100.0%)
Librarian				2 (66.7 %)			1 (33.3 %)	3 (100.0%)
Student					6 (85.7 %)	1 (14.3 %)		7 (100.0%)
Home-maker						1 (100.0%)		1 (100.0%)
Other*					3 (21.3 %)	4 (28.6 %)	7 (50.0 %)	14 (100.0%)
Total	7 (11.3 %)	4 (6.5 %)	5 (8.1 %)	2 (3.2 %)	28 (45.2 %)	8 (12.9 %)	8 (12.9 %)	62 (100.0%)

*Other primary occupations include: registered nurse, technical editor, occupational therapist, video- tape editor, urban planner, real-estate agent, telephone representative, speech language pathologist, instructional technology assistant, self-employed scrap metallurgist, process consultant, school counselor, school psychologist, and retail sales person.

**Other capacities include: reading consultant, editor, speech language pathologist, instructional technology assistant, school counselor, and a person in the process of career change.

As shown in Table 6-8, almost a half of the participants made requests of the AskERIC Q&A Service as a student regardless of their primary occupations – a majority of K-12 teachers, almost a half of the administrators, and some college/university faculty members acted as a student in the IPS process. It should be noted that when participants were asked their occupation at first[10], they reported their primary occupation. They declared that they also were students only after they were asked their *capacity* for the particular request. This finding implies that clients of the AskERIC Q&A Service are more likely to make requests as students regardless of their primary occupation.

Participants' *capacity* was compared with their *IPS goals*, and the result is presented in Table 6-9.

[8] Interview question Q30 asked: "In what capacity did you request information from AskERIC?"

[9] Interview question Q2 asked: "Is the request for information your own or that of someone else?"

[10] Interview question Q28 asked: "What is your occupation(s)?"

Table 6-9: Capacity and IPS Goal (N=62)

Capacity in IPS Process	IPS Goal Category				
	DEGREE SEEKING	DECISION/ACTION PLANNING	TEACHING	Other	Total
K-12 teacher	0	3 (42.9 %)	**4 (57.1 %)**	0	7 (100.0 %)
Faculty	0	0	2 (50.0 %)	2 (50.0 %)	4 (100.0 %)
Administrator/Manager	0	**3 (60.0 %)**	0	2 (40.0 %)	5 (100.0 %)
Librarian	0	1 (50.0 %)	0	1 (50.0 %)	2 (100.0 %)
Student	**28 (100.0 %)**	0	0	0	28 (100.0 %)
Parent	0	**8 (100.0 %)**	0	0	8 (100.0 %)
Other	0	5 (62.5 %)	1 (12.5 %)	2 (25.0 %)	8 (100.0 %)
Total	28 (45.2 %)	20 32.3 %)	7 (11.3 %)	7 (11.3 %)	62 (100.0 %)

As shown in Table 6-9, there seem to be the following patterns of associations between participants' *capacity* and their *IPS goals*:

- All participants who acted as a student had a degree-seeking goal,
- All participants who acted as a parent had a decision/action-planning goal,
- A majority of participants who acted as a K-12 teacher had a teaching goal, and
- A majority of participants who acted as an administrator/manager had a decision/action-planning goal.

The above findings suggest that participants' *capacity* in their IPS processes is highly associated with *their IPS goals*.

ROLE IN IPS PROCESS

Participants' *role* in the IPS processes was categorized into three groups: (1) an *originator* who made requests of AskERIC based on his/her own information need, (2) a *collaborator* who made request for a joint IPS project in which s/he was taking a part, and (3) a *proxy* who made requests representing other persons. Associations among participants' role and IPS goal category, as well as their information sharing behavior are analyzed.

Association between Role and IPS Goal

IPS goal category was compared with their *role* in the IPS processes (Table 6- 10).

Table 6- 10: Role and IPS Goal Category (N=62)

IPS goal category	Role in IPS Process				
	Originator	Collaborator	Proxy	Other	Total
Degree-seeking	**26 (92.9 %)**	**0**	**0**	2 (7.1 %)	28 (100.0 %)
Decision/action-planning	14 (70.0 %)	5 (25.0 %)	1 (5.0 %)	0	20 (100.0 %)
Teaching	6 (85.7 %)	1 (14.3 %)	0	0	7 (100.0 %)
Other	5 (71.4 %)	2 (28.6 %)	0	0	7 (100.0 %)
Total	51 (82.3 %)	8 (12.9 %)	1 (1.6 %)	2 (32.3 %)	62 (100.0 %)

As shown in 6-10, a great majority of participants of the study identified themselves as an *originator*, while a little more than 10% as a *collaborator*, and only one as a *proxy*. There seem to be the following associations between participants' IPS goal and their role in the IPS process:

- Participants with a DEGREE SEEKING goal tend to perceive themselves as acting as an *originator*. However, two participants who were compelled to use the AskERIC Q&A Service for in-class assignments identified themselves as "other."
- Participants with a TEACHING goal tend to perceive themselves as acting as an *originator*. However, a participant who supported students' presentation as an instructional technology assistant identified herself as a *collaborator*.
- While a majority of participants with a DECISION/ACTION PLANNING goal identified themselves as an *originator*, about a quarter reported themselves as a *collaborator*. All five who were acting as a collaborator were involved in socially generated IPS goals of decision/action-planning.

The above findings might imply that IPS processes for socially generated DECISION/ACTION PLANNING goal tended to involve multiple people in information problem solving.

Eighteen participants (29.0 %) indicated that they shared or planned to share information they obtained from AskERIC and/or other sources. Table 6-11 presents the association between participants' *role* in the IPS process and whether they shared information with other people.

Table 6-11: Role in IPS and Information Sharing (N=62)

Role in IPS	Share Information	Unknown	Total
Originator	11 (21.6 %)	40 (78.4 %)	51 (100.0 %)
Collaborator	7 (87.5 %)	1 (12.5 %)	8 (100.0 %)
Proxy	1 (100.0 %)	0	1 (100.0 %)
Other*	0	2 (100.0 %)	3 (100.0 %)

* Participants in "Other" category are those who sent requests at a college computer lab as instructed.

As shown in Table 6-11, all but one of the participants who identified themselves as collaborators in the IPS (involved in a joint project with other people) reported that they shared information with other project members. In addition, some of those who identified themselves as originators (representing their own information need) shared information with other people.

SUMMARY

This chapter reported study findings on situational factors associated with the use of the AskERIC Q&A Service and provided some answers to the research question RQ2: what situational factors do users perceive to be salient when they make requests of human intermediaries.

User goals are structured in multiple levels as suggested by the goal model of Bandura's (1989) social cognitive theory in which a higher-level distal goal (IPS goal) generate lower-level immediate goals (goals of using the AskERIC Q&A Service). IPS goals are found to be associated with other dimensions of information needs including types of information sought, perceived importance of obtaining information, and inherent user biases.

Provided that human IPS activities are goal-oriented, IPS processes themselves seem to be structured by the user goals. Processes of how such user goals were generated also found to be associated with users' IPS behavior. Imposition of user goals accompanies with deadline, which generate time pressure. Social influence in generating user goals limits users' freedom in IPS processes. Only those user goals generated by personal interests complete freedom of choices of topic and information sources. Limits of freedom in IPS processes generated from imposition and social influence may be associated with possible modifications of user goals or information needs.

Users' capacity is found to be associated with user goals. Clients of the AskERIC Q&A Service are likely to make requests as a student regardless of their primary occupations. It might be important to identify the *capacity* or users in their IPS processes, rather than primary occupation, in order to obtain a better understanding of their information needs.

CHAPTER SEVEN

REASONS FOR USING THE AskERIC Q&A SERVICE

This chapter presents the study's findings on reasons articulated by participants for using the AskERIC Q&A Service and provides some additional answers to the research question RQ2: *what situational factors do users perceive to be salient when they make requests of human intermediaries?* The chapter first describes general patterns of associations among reasons observed at the global level. Through the analysis, unique patterns of relationships among reasons concerning the following three situational factors were identified:

- Whether participants did self-searching before making requests of AskERIC,
- Whether participants had experience in using the AskERIC Q&A Service and/or ERIC system, and
- Different levels of participants' perceived IPS skill.

Thus, reasons peculiar to each group of the above three situational variables, as well as causal and temporal relationships of reasons within each group will also be described.

SHARED REASONS FOR USING THE ASKERIC Q&A SERVICE

Participants articulated a variety of reasons for using the AskERIC Q&A Service for the IPS in response to Q12[1] and elsewhere during the interview. Through content analysis of interview data, the study extracted on average 5.2 different reasons per participant (ranged between 1 and 12 per participant). Table 7-1 presents reasons articulated by two or more participants[2] classified into six categories of situational factors. Definitions and examples of data instances of these reasons are presented in Appendix B3.

As shown in Table 7-1, situational factors in all six categories were reported to have caused participants to select the service. Among them, C7: A POSITIVE IMAGE OF THE ASKERIC Q&A SERVICE was the major reason articulated by a majority of participants.

CAUSAL AND TEMPORAL RELATIONSHIPS AMONG REASONS

Reasons for using the AskERIC Q&A Service were found to have complex relationships within themselves. When participants articulated multiple reasons for using the AskERIC Q&A Service, they often used causal and temporal conjunctions. Thus, causal and temporal relationships among reasons for selecting the AskERIC Q&A Service were analyzed using a pattern coding technique recommended by Miles and Huberman (1994, p. 69) in order to identify shared patterns of relationships among reasons. Causal relationships between two reasons were identified by participants' articulations of causal terms (e.g., because, so, since, etc.) and coded as "A=>B," meaning REASON A caused REASON B. Temporal relationships were identified by participants' articulations of temporal terms (e.g., when, then, after, as soon as, etc.) and coded as "A→B," meaning REASON A preceded REASON B. Whenever two or more participants articulated the same relationship between two identical reasons, the study captured it as a shared pattern of relationship between these two reasons. The coding results indicated that 21 reasons were complex reasons involved in causal and/or temporal relationships, while 19 reasons were simple reasons independent of any causal/temporal relationship. Relationships identified between complex reasons, as well as simple reasons, are depicted in Figure 7-1. Complex reasons are located at the upper part of the graphic, while simple reasons are at the lower part of Figure 7-1. The distinction between simple and complex reasons is also provided in the last column of Figure 7-1.

[1] Interview question Q12 asked, "Please tell me what made you decide to use AskERIC to find the information this time."

[2] Reasons articulated by only one participant and not included in the table are: mediated-searching failure; negative image of self-searching; confidence in using the service; stealing time; money concern; vicarious-learning; top-site in Education/research category of a browser; IPS tasks should be delegated; federal sources are good; good name; own age is too old to learn self-searching.

Table 7-1: Reasons for Using the AskERIC Q&A Service (N=62)

Category	Property	Participants*	Rank	Complexity**
A.IPS PROCESSES	A1 PLANNED USE	3	27	Simple
	A2 SELF-SEARCHING FAILURE	23	2	Complex
	A3 ENCOUNTER ASKERIC	22	2	Complex
	A4 HABITUAL USE	7	17	Complex
	A5 TRYING NEW SOURCE	3	27	Simple
	A6 EXHAUSTED SOURCES	2	37	Simple
	A7 ERIC SEARCH	11	8	Complex
	A8 INTERNET SEARCH	13	4	Complex
B.INFORMATION NEEDS	B1 NEED INFORMATION	9	14	Simple
	B2 VERIFY OWN SEARCH	2	37	Simple
	B3 NEED HELP IN IPS	10	12	Complex
	B4 TESTING SERVICE	5	21	Simple
C.COGNITIVE STATES	C1 KNOW ASKERIC	2	37	Simple
	C2 KNOW ERIC	3	27	Complex
	C3 LIMITED IPS SKILL	12	8	Complex
	C4 REMEMBER ASKERIC	3	27	Complex
	C5 REMEMBER ERIC	4	24	Complex
	C6 TOPIC/DOMAIN MATCHED	12	6	Simple
	C7 POSITIVE IMAGE OF ASKERIC	35	1	Complex
	C8 POSITIVE IMAGE OF ERIC	11	8	Complex
	C9 NEGATIVE IMAGE OF LIBRARIES	3	27	Complex
	C10 NEGATIVE IMAGE OF INTERNET	7	17	Complex
	C11 LOGICAL CHOICE	3	27	Simple
	C12 INTUITION	2	37	Simple
D.AFFECTIVE STATES	D1 FRUSTRATION OF SELF-SEARCHING	8	16	Complex
	D2 OPPORTUNISTIC HOPE	11	8	Complex
	D3 NOTHING TO LOSE	3	27	Simple
E.SOCIAL CONTEXTS	E1 IMPOSITION OF ASKERIC	3	27	Simple
	E2 IMPOSITION OF ERIC	3	27	Complex
	E3 GOOD EXPERIENCE ASKERIC	13	4	Complex
	E4 GOOD EXPERIENCE ERIC	11	8	Complex
	E5 GOOD EXPERIENCE WITH HUMAN INTERMEDIARY	2	37	Simple
	E6 HUMAN INFLUENCE ASKERIC	9	14	Simple
	E7 HUMAN INFLUENCE ERIC	4	24	Complex
	E8 REPUTATION OF ASKERIC	5	21	Simple
	E9 MEDIA INFLUENCE ASKERIC	5	21	Simple
	E10 TIME LIMITATION	7	17	Simple
F.ENVIRONMENTAL CONDITIONS	F1 CONVENIENCE	10	12	Complex
	F2 BOOKMARKED	3	27	Simple
	F3 ASKERIC AVAILABLE	6	20	Simple
Average # of reasons		320/62 = 5.2		

* The number in this column represents the number of participants who articulated each of the reasons (N=62).

** Complex reasons are those that have a causal/temporal relationship with other reasons; simple reasons are those that have no such relationship.

Figure 7-1: Association of Reasons for Selecting the AskERIC Q&A Service

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This network represents complex associations among a variety of reasons for selecting the AskERIC Q&A Service. Three major clusters of associations of reasons in this network are: (1) centered around A3: ENCOUNTERING THE ASKERIC Q&A SERVICE; (2) centered around A2: SELF-SEARCHING FAILURE; and (3) centered around C7: A POSITIVE IMAGE OF THE ASKERIC Q&A SERVICE. Among them, the first two reasons are apparently associated with participants' *self-searching before sending requests* to AskERIC. Thus, a variety of factors related to self-searching process (e.g., A2: SELF-SEARCHING FAILURE, D1: FRUSTRATION WITH SELF-SEARCHING, and A3: ENCOUNTERING THE ASKERIC Q&A SERVICE) are reported to have causal relationships that led participants to use the service. The second cluster is not only related to the self-searching process, but also seems to be relevant to participants' *perceived levels of IPS skill*, since it involved causal relationships with A2: SELF-SEARCHING FAILURE and B3: NEED FOR HELP IN IPS.

On the other hand, the center of the third cluster, C7: A POSITIVE IMAGE OF THE ASKERIC Q&A SERVICE, was articulated by a majority of participants (35 or 56.5 %). Since a relatively large number of participants (11 or 17.7 %) articulated the causal relationship between E3: GOOD EXPERIENCES OF USING THE ASKERIC Q&A SERVICE and C7: POSITIVE IMAGE OF THE SERVICE, this suggests that participants' *experiences in using the service* (E3: GOOD EXPERIENCE ASKERIC) may be another source of the complexity of associations among reasons.

CAUSAL RELATIONSHIPS AMONG CATEGORIES OF REASONS

The causal relationships between reasons on the level of main categories of situational factors were analyzed. Table 7-2 presents causal relationships of reasons among six main categories of A: IPS PROCESS, B: INFORMATION NEEDS, C: COGNITIVE STATES, D: AFFECTIVE STATES, E: SOCIAL CONTEXTS, and F: ENVIRONMENTAL CONDITIONS.

Table 7-2: Causal Relationship between Categories

Relationship of Categories	Causal Relationship Between Reasons
A: IPS PROCESSES => B: INFO-NEED	A2 SELF-SEARCHING FAILURE => B3 NEED HELP IN IPS
C: COGNITIVE => A: IPS PROCESSES	C3 LIMITED IPS SKILL => A2 SELF-SEARCHING FAILURE
	C7 POSITIVE IMAGE OF ASKERIC => A4 HABITUAL USE
	C9 NEGATIVE IMAGE OF LIBRARIES => A8 INTERNET SEARCH
A: IPS PROCESS =>D: AFFECTIVE	A2 SELF-SEARCHING FAILURE => D1 FRUSTRATION OF SELF-SEARCHING
E: SOCIAL => A: IPS PROCESSES	E2 IMPOSITION OF ERIC => A7 ERIC SEARCH
	E3 GOOD EXPERIENCE ASKERIC => A4 HABITUAL USE
	E4 GOOD EXPERIENCE ERIC => A7 ERIC SEARCH
	E7 HUMAN INFLUENCE ERIC => A7 ERIC SEARCH
F: ENVIRONMENT => A: IPS PROCESSES	F1 CONVENIENCE => A8 INTERNET SEARCH
C: COGNITIVE => B: INFO-NEED	C3 LIMITATION OF IPS SKILL => B3 NEED HELP IN IPS
C: COGNITIVE => D: AFFECTIVE	C3 LIMITATION OF IPS SKILL => D2 OPPORTUNISTIC HOPE
E: SOCIAL => C: COGNITIVE	E3 GOOD EXPERIENCE ASKERIC => C7 POSITIVE IMAGE OF ASKERIC
	E4 GOOD EXPERIENCE ERIC => C7 POSITIVE IMAGE OF ASKERIC
	E4 GOOD EXPERIENCE ERIC => C8 POSITIVE IMAGE OF ERIC

Table 7-2 describes, for example, reason A2 SELF-SEARCHING FAILURE under the category of A: IPS PROCESSES has a causal relationship with the reasons under the two categories of B: INFORMATION NEEDS (i.e., B3 NEED HELP IN IPS) and D: AFFECTIVE STATES (i.e., D1 FRUSTRATION OF SELF-SEARCHING). In addition, as shown in the Figure 7-1, reasons under all six categories are reported to have a direct causal relationship with participants' selection of the AskERIC Q&A Service. Since the selection of the AskERIC Q&A Service is under the category of A: IPS PROCESSES, all five other categories have causal relations with it. Moreover, participants' action of sending requests to the AskERIC Q&A Service eventually caused the AskERIC Q&A Service to receive the requests, and therefore, changed the social contexts. Thus, the causal relationship from A: IPS PROCESSES to E: SOCIAL CONTEXTS exists. These global relationships among six categories described above are presented in Figure 7-2.

Figure 7-2: Relationships among Categories of Situational Factors

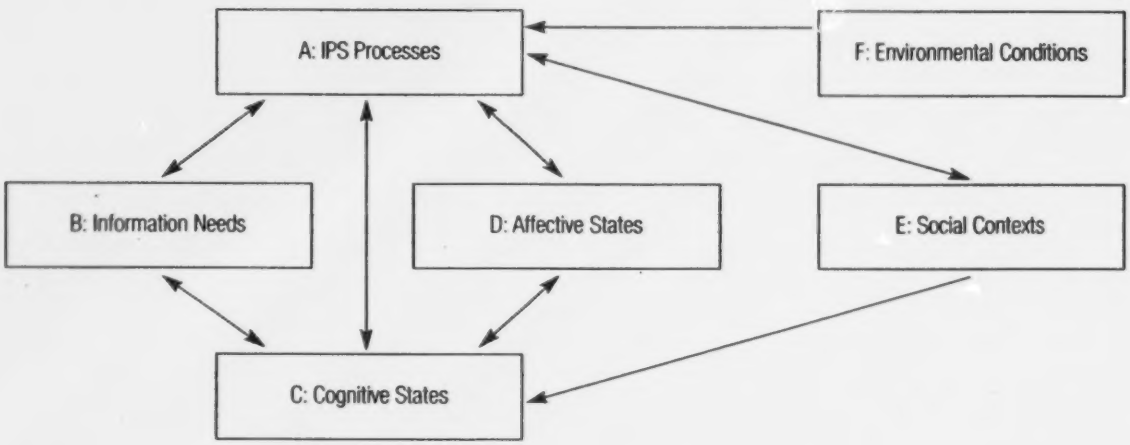

Figure 7-2 suggests the following:

- Bi-directional causal relationships are observed between A: IPS PROCESS and the three categories of B: INFORMATION NEEDS D: AFFECTIVE STATES, and E: SOCIAL CONTEXTS.
- A uni-directional relationship is observed from the category of C: COGNITIVE STATES to the three categories of A: IPS PROCESS, B: INFORMATION NEEDS, and D: AFFECTIVE STATES, implying that cognitive states influence IPS processes not only directly but also indirectly through information needs and affective states.

- Uni-directional relationships are observed from the category of E: SOCIAL CONTEXTS to the category of C: COGNITIVE STATES, implying that social contexts influence IPS process not only directly but also indirectly through cognitive states.
- A uni-directional relationship is observed from the category of F: ENVIRONMENTAL CONDITIONS to A: IPS PROCESSES, implying that environmental conditions influence IPS processes directly.
- The category of F: ENVIRONMENTAL CONDITIONS does not receive causal influence from other categories of situational factors.

Bandura's (1986) social cognitive theory assumes a triadic reciprocality between behavior, internal states, and external contexts, all interacting with each other, underlying human functioning. Such causal relationships assumed by the theory were, thus, partially identified on the micro level as causal relationships among reasons for selecting a particular human intermediation (i.e., the AskERIC Q&A Service). Though inconclusive, recognition of triadic reciprocal causal relationships among three factors in naturally occurring IPS processes as seen from users' views implies the applicability of the social cognitive viewpoints to IPS processes.

Figure 7-2 shows that both reasons under the category of A: IPS PROCESS that influenced other categories (A2: SELF-SEARCHING FAILURE and A3: ENCOUNTERED THE ASKERIC Q&A SERVICE) are relevant only to those participants who did *self-searching before sending the requests*. Thus, whether or not participants did self-searching before sending the requests may represent different patterns of causal relationships between reasons for selecting the service. Similarly, both reasons under the category of E: SOCIAL CONTEXTS (E3: GOOD EXPERIENCE OF THE ASKERIC Q&A SERVICE; and E4: GOOD EXPERIENCE OF ERIC) are relevant only to those who had *experience in using the AskERIC Q&A Service* and/or the ERIC system. Thus, whether participants had experience in using the AskERIC Q&A Service and/or the ERIC system may represent different patterns of causal relationships between reasons for selecting the service. In addition, the reason under the category of C: COGNITIVE STATES that influenced two other categories of B: INFORMATION NEEDS and D: AFFECTIVE STATES is the C3: LIMITED IPS SKILL. Thus, the difference in *levels of perceived IPS skill* might represent different patterns of causal relationships of reasons. Since these three situational variables were also recognized as centers of three clusters in the causal and temporal network of reasons (Figure 7-1), the study further analyzed patterns of associations between these three variables and reasons for selecting the AskERIC Q&A Service:

a. Whether participants did self-searching before making requests of AskERIC,
b. Whether participants had experience in using the AskERIC Q&A Service and/or ERIC system, and
c. Different levels of participants' perceived IPS skill.

The results of analysis are presented in the next sections.

Table 7-3: Association between Reasons and Self-searching before AskERIC (N=62)

Whether Participant Did Self-searching		a1: Yes*	a2: No**	Total
Category	Code	(n=48)	(n=14)	(N=62)
A: IPS PROCESSES	A1 PLANNED USE	2	1	3
	A2 SELF-SEARCHING FAILURE	**23**	0	23
	A3 ENCOUNTER ASKERIC	**22**	0	22
	A4 HABITUAL USE	5	2	7
	A5 TRYING NEW SOURCE	2	1	3
	A6 EXHAUSTED SOURCES	**2**	0	2
	A7 ERIC SEARCH	11	0	11
	A8 INTERNET SEARCH	13	0	13
B: INFORMAT ION NEEDS	B1 NEED INFORMATION	8	1	9
	B2 VERIFY OWN SEARCH	**2**	0	2
	B3 NEED HELP IN IPS	8	2	10
	B4 TESTING SERVICE	4	1	5
C: COGNITIVE STATES	C1 KNOW ASKERIC	1	1	2
	C2 KNOW ERIC	**3**	0	3
	C3 LIMITED IPS SKILL	10	2	12
	C4 REMEMBER ASKERIC	**3**	0	3
	C5 REMEMBER ERIC	**4**	0	4
	C6 TOPIC/DOMAIN MATCHED	11	1	12
	C7 POSITIVE IMAGE OF ASKERIC	28	7	35
	C8 POSITIVE IMAGE OF ERIC	**11**	0	11
	C9 NEGATIVE IMAGE OF LIBRARIES	2	1	3
	C10 NEGATIVE IMAGE OF INTERNET	**7**	0	7
	C11 LOGICAL CHOICE	2	1	3
	C12 INTUITION	1	1	2
D: AFFECTIVE STATES	D1 FRUSTRATION OF SELF-SEARCHING	**8**	0	8
	D2 OPPORTUNISTIC HOPE	**11**	0	11
	D3 NOTHING TO LOSE	**3**	0	3
E: SOCIAL CONTEXTS	E1 IMPOSITION OF ASKERIC	0	**3**	3
	E2 IMPOSITION OF ERIC	2	1	3
	E3 GOOD EXPERIENCE ASKERIC	8	5	13
	E4 GOOD EXPERIENCE ERIC	**11**	0	11
	E5 GOOD EXPERIENCE WITH HUMAN INTERMEDIARY	1	1	2
	E6 HUMAN INFLUENCE ASKERIC	5	4	9
	E7 HUMAN INFLUENCE ERIC	**4**	0	4
	E8 REPUTATION ASKERIC	**5**	0	5
	E9 MEDIA INFLUENCE ASKERIC	2	3	5
	E10 TIME LIMITATION	6	1	7
E: ENVIRON MENTAL CONDITIONS	F1 CONVENIENCE	8	2	10
	F2 BOOKMARKED	2	1	3
	F3 ASKERIC AVAILABLE	**6**	0	6
Average # of reasons		276/48 = 5.8	45/14 = 3.2	320/62 = 5.2

* Reasons identified as unique to those who did self-searching are shown in bold under this column.

** Reasons identified as unique to those who did not perform self-searching are shown in bold under this column.

SITUATIONAL FACTORS ASSOCIATED WITH SELF-SEARCHING BEFORE AskERIC

Reasons for using the AskERIC Q&A Service were analyzed for whether the participants did self-searching before sending the requests. In this analysis, participants were categorized into two groups: (a1) those who did self-searching before sending the requests (n=48); and those who did not (n=14). Table 7-3 presents the number (over two) of participants in each group who reported each of the reasons for using the AskERIC Q&A Service.

In Table 7-3, 17 reasons identified as unique to those who did self-searching are shown in bold under the column "a1: Yes." And one reason as unique to those who did not perform self-searching is shown in bold under the column "a2: No."

Table 7-3 also shows that participants who did self-searching (a1) gave, on average, 5.8 reasons (ranges between 1 and 12 reasons per participant), while those who did not perform self-searching (a2) gave, on average 3.2 (ranged between 1 and 6 reasons per participant). Thus, participants who did self-searching gave more reasons than those who did not, implying that a variety of situational factors in self-searching led them to use the service.

CAUSAL AND TEMPORAL RELATIONSHIP OF REASONS IN RELATION TO SELF-SEARCHING

Table 7-4 presents causal and temporal relationships between pairs of reasons elicited from two or more participants for each of two groups of participants based on whether they did self-searching before sending requests.

Table 7-4: Causal and Temporal Relationship between Reasons by Self-Searching (N=62)

Causal Relationship / Whether Participant Did Self-searching	a1:Yes (n=48)	a2: No (n=14)
A2 SELF-SEARCHING FAILURE => B3 NEED HELP IN IPS	5	0
A2 SELF-SEARCHING FAILURE => D1 FRUSTRATION OF SELF SEARCHING	7	0
A3 ENCOUNTER ASKERIC => C4 REMEMBER ASKERIC	2	0
A3 ENCOUNTER ASKERIC => C5 REMEMBER ERIC	3	0
A3 ENCOUNTER ASKERIC → D2 OPPORTUNISTIC HOPE	10	0
A7 ERIC SEARCH → A2 SELF-SEARCHING FAILURE	7	0
A7 ERIC SEARCH → A3 ENCOUNTER ASKERIC	7	0
A8 INTERNET SEARCH → A2 SELF-SEARCHING FAILURE	6	0
A8 INTERNET SEARCH → A3 ENCOUNTER ASKERIC	8	0
C2 KNEW ERIC => C5 REMEMBER ERIC	3	0
C3 LIMITATION OF IPS SKILL => A2 SELF-SEARCHING FAILURE	2	0
C3 LIMITATION OF IPS SKILL => B3 NEED HELP IN IPS	3	2
C3 LIMITATION OF IPS SKILL => C7 POSITIVE IMAGE OF ASKERIC	3	1
C3 LIMITATION OF IPS SKILL => D2 OPPORTUNISTIC HOPE	2	0
C7 POSITIVE IMAGE OF ASKERIC => A4 HABITUAL USE	3	1
C8 POSITIVE IMAGE OF ERIC => C7 POSITIVE IMAGE OF ASKERIC	5 (10.4 %)	0
C9 NEGATIVE IMAGE OF LIBRARIES => A8 INTERNET SEARCH	2	0
C10 NEGATIVE IMAGE OF INTERNET => C7 POSITIVE IMAGE OF ASKERIC	6	0
E2 IMPOSITION OF ERIC => A7 ERIC SEARCH	2	0
E3 GOOD EXPERIENCE ASKERIC => A4 HABITUAL USE	3	1
E3 GOOD EXPERIENCE ASKERIC => C7 POSITIVE IMAGE OF ASKERIC	7	4
E4 GOOD EXPERIENCE ERIC => A7 ERIC SEARCH	3	0
E4 GOOD EXPERIENCE ERIC => C7 POSITIVE IMAGE OF ASKERIC	2	0
E4 GOOD EXPERIENCE ERIC => C8 POSITIVE IMAGE OF ERIC	5	0
E7 HUMAN INFLUENCE ERIC => A7 ERIC SEARCH	4	0
F1 CONVENIENCE => A8 INTERNET SEARCH	3	0

As shown in Table 7-4, all causal and temporal relationships articulated by two or more participants are also identified among participants who did self-searching (a1). Only five causal relationships are identified among those who did not perform self-searching (a2). Thus, causal and temporal relationships of reasons in selecting the AskERIC Q&A Service are more complex for those who did self-searching (a1) than those who did not perform self-searching prior to using AskERIC.

Based on the above, the differences between participants who did self-searching before sending the requests (a1) and those who did not perform self-searching before sending the requests (a2) are as follows:

- Participants who did self-searching had more reasons than those who did not.
- Participants who did self-searching had more unique reasons than those who did not.
- Participants who did self-searching had more complex causal and temporal relationships between reasons than those who did not.

The recognition of the complexity of causal and temporal relationships of reasons among those who did self-searching before sending requests led to further analysis of the situational factors associated with the participants' self-searching process. The next section presents key situational factors associated with the participants' self-searching process before making requests to AskERIC.

SITUATIONAL FACTORS IN SELF-SEARCHING PROCESS

Through content analysis of interview data obtained in response to Q14[3], 48 participants were identified as having conducted self-searching before sending the requests. They reported various internal and external situations as associated with their self-searching processes before making the requests to the AskERIC Q&A Service.

Association between Perceived IPS Skill and Confidence with Self-searching

Participants' *perceived level of their own IPS skill* seems to be positively associated with their *confidence with self-searching*. Participants articulated their perceived level of IPS skill and confidence with self-searching in response to question Q11[4] and elsewhere in the interview. Table 7-5 presents the relationship between these two constructs among 48 participants who did self-searching before making the requests of AskERIC.

Table 7-5: Relation Between Perceived IPS Skill and Confidence with Self-searching (N=48)

	Confidence with Self-searching				
Perceived IPS Skill	High	Medium	Low	Unknown*	Total
High	**18 (72.0 %)**	4 (16.0 %)	0	3 (12.0 %)	25 (100.0 %)
Medium	4 (36.4 %)	1 (9.1 %)	4 (36.4 %)	2 (18.2 %)	11 (100.0 %)
Low	0	1 (16.7 %)	**4 (66.7 %)**	1 (16.7 %)	6 (100.0 %)
Unknown*	4 (66.7 %)	0	2 (33.3 %)	0	6 (100.0 %)
Total	26 (54.2 %)	7 (14.9 %)	10 (21.3 %)	7 (14.9 %)	48 (100.0 %)

* Not available due to incomplete data

[3] Interview question Q14 asked, "Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information before you sent your request to AskERIC Question/Answering service. Probing questions under Q14 asked, "When did you consult it? Why did you consult the source? How long did it take? What was the result?"

[4] Interview question Q11 asked, "Please describe any knowledge and/or skills you had to help you find information. Probe questions used to elicit *perceived IPS skill* were "How familiar were you with locating information in sources other than AskERIC?" "How familiar were you with using libraries to find information?" and "How familiar were you with using computers to search for information?" Probe question used to elicit *confidence in self-searching* was "How confident did you feel in your ability to conduct the search if you did it by yourself?"

As shown in Table 7-5, 18 of 25 participants identified as having a high level of perceived IPS skill reported that they had a high level of confidence with self-searching. On the other hand, 4 of 6 participants who were identified as having a low level of perceived IPS skill indicated that they had a low level of confidence with self-searching. Thus, the data suggest that participants' perceived level of their own IPS skill seems to be positively associated with their confidence with self-searching.

Association Between Perceived IPS Skill and Need for Help

Participants with a low level of perceived IPS skill reported needing help in self-searching. Among six participants who were identified as having a low level of perceived IPS skill, four reported that they had help from other people (e.g., a librarian, a colleague, and husband) in performing self-searching, three said they usually ask for the help of librarians in libraries. Thus, participants with a low perceived IPS skill seem to always need help in searching for information both in self-searching electronic sources and in using conventional libraries.

Transition of Affective State in Self-searching

In general, the participants' *affective states* shifted from the initial positive feeling to negative feeling with self-searching failure, and were supplanted by a positive feeling at the point when they found and/or decided to use the AskERIC Q&A Service. Participants articulated their feeling during self-searching in response to Q17[5] and elsewhere during the interview[6]. Table 7-6 presents participants' *affective states* at three points in self-searching: (1) when they started self-searching; (2) before finding or deciding to use the AskERIC Q&A Service; and (3) when they found or decided to use the Q&A Service.

Table 7-6: Shift of Affective States in Self-Searching (N=48)

Affective State	(1) Beginning	(2) Before AskERIC	(3) Find/decide AskERIC
Positive	24 (50.0 %)	11 (22.9 %)	34 (70.8 %)
Negative	7 (14.6 %)	27 (56.3 %)	0
Ambivalent	2 (4.2 %)	2 (4.2 %)	2 (4.2 %)
No emotion	4 (8.3 %)	6 (12.5 %)	6 (12.5 %)
Unknown*	11 (22.9 %)	2 (4.2 %)	6 (12.5 %)
Total	48 (100.0 %)	48 (100.0 %)	48 (100.0 %)

* Not available due to incomplete data

As shown in Table 7-6, participants' affective states generally changed from initial positive feelings (confident, interested, empowered, etc.) to negative feelings (frustrated, annoying, helpless, etc.) associated with self-

[5] Interview question Q17 asked: "please describe how you felt while you were searching for information (e.g., anxious, confident, frustrated, happy, helpless, etc.)

[6] Some participants' articulation of their feelings in response to Q17 suggested that they might have felt obliged to choose from presented choices. Thus, the study triangulated these responses with participants' unsolicited articulation of their feelings provided elsewhere in the interview.

searching failure, then were supplanted by positive feelings (hopeful, relieved, etc.) at the point when they found and/or decided to use the AskERIC Q&A Service.

Participants who had a low level of perceived IPS skill and low level of confidence with self-searching, however, tended to have negative emotions right from the beginning of self-searching. Six out of seven participants whose initial affective states were negative had very limited perceived IPS skills in self-searching. They explained their negative feeling by a low level of confidence with self-searching[7]. On the other hand, some of the participants with a high level of perceived IPS skill indicated that they did not have much emotional involvement in self-searching, regardless of its outcome[8]. Thus, there seem to be some patterns of associations between *perceived level of IPS skill* and *affective states* in self-searching. Data implied that a low level of perceived IPS skill tended to be associated with negative emotion in self-searching, while a high level of perceived IPS skill was not.

Use of human help may reduce or eliminate negative emotion in self-searching. One participant who did self-searching for the first time reported that she had a positive feeling (interested) throughout self-searching even though it was not successful. This was probably because she did the search at a college library and received the help of a librarian. Another participant articulating her frustration with self-searching failure at the library indicated that she felt confident when she received the help of a librarian there. The other participant who had remote help from her husband in self-searching at home tended to have a positive emotion during the search, even though she had an ambivalent emotion at the beginning, and she kept a positive feeling during self-searching.

Thus, *affective states* seem to be associated with self-searching in the following ways:

- In general, for participants with a high level of perceived IPS skill, affective states shift from initial positive feelings to negative feelings, and then are supplanted by positive feelings.
- A negative feeling in self-searching is often associated with self-searching failure.
- A negative feeling at the beginning of self-searching is associated with a low level of perceived IPS skill.
- A positive feeling in self-searching perceived by those with a low level of perceived IPS skill is associated with availability of human help.
- Participants with a high level of perceived IPS skill tended to have less emotional involvement in self-searching.

[7] Examples of data instances are presented in Appendix D8.

[8] Examples of data instances are provided in Appendix D9.

These findings imply that the self-efficacy in Bandura's (1986) social cognitive theory operates in users' IPS processes, as suggested by Wilson (1999). The theory emphasizes the centrality of self-efficacy – people's belief in their own capability – in generating their thoughts, behavior, and affective states, and proposes that self-efficacy affects the course of action people choose to take, the amount of efforts they put forth, their resistance to failure, and the level of accomplishment they achieve.

The finding of differences in emotional involvement depending upon users' perceived level of IPS skill, or IPS self-efficacy, might have implications for Kuhlthau's (1992) model of Information Search Process (ISP) which proposes a common pattern of affective states that shift from negative in an early stage to positive in a later stage. Only those who had a low level of perceived IPS skill reported negative emotion (frustration, anxiety, fear, etc.) from the beginning of their self-searching. Participants' with a higher level of perceived IPS skill reported a negative emotion only when they had unsuccessful self-searching. Still others with a high level of perceived IPS skill did not report any emotional involvement in their IPS processes even when their self-searching was not successful. Rather, they exhibited bewilderment at being asked about affective states in their IPS processes. This is probably because they might have accustomed to the uncertainty accompanying with IPS and, therefore, had no emotional involvement but felt normal all through their IPS processes. If so, Kuhlthau's findings of commonly shared characteristics of emotional involvement in IPS, particularly the negative emotion at an early stage, might well be caused by a low level of perceived IPS skill in people she studied. The model might need to be tested for users with a high level of IPS skill who are habitual information seekers.

Positive Feelings Associated with the Decision of Using the AskERIC Q&A Service

A great majority (33 or 70.2 %) of participants reported a positive feeling at the time when they decided to use the AskERIC Q&A Service. However, the nature of the positive feeling was different depending on whether they had experience in using the service or not.

Participants who had some *experience in using the AskERIC Q&A Service* reported that they had *confidence* with using the service and a clear image of the outcome of the service. They usually attributed their confidence to previous good experience[9]. Some participants who had *experience in using the service* indicated that their use of the service as a last resort for information was a *planned action*[10]. Thus, participants with some *experience in using the AskERIC Q&A Service* had *confidence* about the outcome of the service, probably based on the positive mental model of the service generated from their past *good experience*. For these participants, the use of the service may have been a part of their *planned action*.

[9] An example of data instance is provided in Appendix D10.

[10] An example of data instance is provided in Appendix D11.

On the other hand, participants who had never used the service generally expressed an optimistic but ambivalent feeling at the time when they found the AskERIC Q&A Service unexpectedly. Their image of the service and the expectations they had for the outcome of the service were relatively obscure particularly when they did not know anything about the ERIC system[11]. This particular feeling accompanied with encountering the AskERIC Q&A Service was labeled "opportunistic hope," which is defined as: "an optimistic but ambivalent feeling of hope generally perceived by those who encountered the AskERIC Q&A Service unexpectedly in self-searching."

Participants who had no experience in using the AskERIC Q&A Service typically expressed this feeling as a reason for selecting the service. Searchers on the Internet would encounter a variety of information sources all the time. Therefore, they should select sources from among available avenues or links to find their ways to relevant information. Many of the participants who selected the AskERIC Q&A Service from among other sources they encountered said they selected it because of an *opportunistic hope* they had at the time of the encountering. This suggests that *opportunistic hope* may be a motivational factor for selecting the AskERIC Q&A Service from among all available sources. In other words, the *opportunistic hope* seems to be a factor that introduces situated actions into IPS processes.

Three participants who encountered the AskERIC Q&A Service in self-searching and had an *opportunistic hope* reported that they *changed their IPS goals*[12]. Thus, the combination of the encountering and an opportunistic hope did change these participants' current IPS goals, at least temporarily, and led them to activate other IPS goals. This example suggests that the situated actions introduced by the combination of the *encountering* and *opportunistic hope* may not be limited to the selection of unknown sources, but may also include *changes in IPS goals*.

Thus, *experience* and *encountering* seem to be associated with self-searching behavior in the following ways:

- *Experience in using the AskERIC Q&A Service* is associated with the prior *mental model* of the service.
- *Experience in using the AskERIC Q&A Service* is associated with *confidence* in selecting the service as a source of information.
- An *opportunistic hope* is associated with *encountering* the service in self-searching.
- An *opportunistic hope* is associated with the *selection of unknown sources/services* from among other available sources.
- An *opportunistic hope* is associated with *changes in IPS goals*.

[11] An example of data instances is provided in Appendix D12.

[12] An example of data instance is provided in Appendix D13.

Suchman (1987) argued that the view of purposeful action to be determined by plans is rooted in the biases of Europeans, who tend to value logic and rationality and that the essential nature of human action is situated and ad hoc. Many researchers who take the users' perspective have also captured these characteristics of situatedness in users' IR and IPS behavior (O'Day & Jeffries, 1993a, 1993b; Hert, 1995, 1997; Spink 1997a; Xie, 1997).

As reported above, among 22 participants who accidentally discovered AskERIC in their self-searching, three reported that they switched their IPS goals – they were seeking information on different topic for other IPS goals, but changed the goal at the time they encountered AskERIC and sent requests based on suddenly activated IPS goals. The other 19 participants who also accidentally discovered AskERIC in self-searching sent requests for information on the topic of their self-searching, but the use of AskERIC was an unplanned action inspired by the encountering. In both cases, they typically reported that they had opportunistic hope at the time of encountering.

Encountering may be a ubiquitous phenomenon in information-seeking. The study findings imply that users' IPS processes might consist of a series of encountering that generates their situated actions toward their IPS goals; hence, users are often looking for information that they had never seen before by exploring familiar or novel sources. A participant described in the interview the opportunistic nature of IPS processes on the Internet:

> ... the Internet you just kind of search. And somehow I got onto AskERIC... So, when I found AskERIC, they said, if you have a question, please ask. OK, I will. And if I got a good answer, great, if not that's OK. I'll keep looking (P54).

As exemplified above, users may be expecting to encounter novel sources by using IR systems or Internet search engines and choose sources (documents, websites, Q&A services, etc.) to investigate questions or looking for information based on their own relevance judgments or opportunistic hope they had at the time they encountered these sources. In that sense, information-seeking in electronic environments might be opportunistic and consist of cumulative situated actions guided by the IPS goals. If so, the combination of source encountering and an opportunistic hope, identified in this study as a factor that generated changes in users' behavior, might also have implications on relevance judgment in conventional IR research. In other words, users are likely to encounter a list of metadata of unfamiliar sources that match their query in searching bibliographic databases. They may select from among these metadata to follow up based on their own relevance judgments or an opportunistic hope they had at the encountering of these metadata.

Use Experience and Human Influence in Choosing Information Sources

Experience was identified as a reason for participants searching the ERIC database and/or using the AskERIC Q&A Service from among a variety of information sources. Eleven participants reported their prior good experience as a reason for using the ERIC database for self-searching. This suggests that the selection of the ERIC database as a source for self-searching was associated with participants' experience in using the database.

Participants reported instances of *human influence* on their IPS process prior to sending the requests to the AskERIC Q&A Service[13]. Participants fell into three groups based on whether human influence had affected their selecting the AskERIC website and/or the Q&A Service: (1) those who were affected by human influence in selecting the AskERIC Q&A Service; (2) those who were affected by human influence in selecting the AskERIC website but not the Q&A Service; and (3) those who were not affected by human influence in selecting either the AskERIC website or the Q&A Service. Table 7-7 presents the relationship between the experience of using the AskERIC Q&A Service and/or ERIC database and the human influences.

Table 7-7: Relation Between Experience and Human Influence (N=48)

Human Influence / Experience	(1) Human influence on AskERIC website	(2) Human influence on Q&A	(3) No human influence	Total
(b1) Experience with Q&A Service	0	1 (7.1 %)	**13 (92.9 %)**	14 (100.0 %)
(b2) Experience with ERIC database but not with the Q&A Service	2 (8.7 %)	0	**21 (91.3 %)**	23 (100.0 %)
(b3) No experience of ERIC database or Q&A Service	**5* (45.5 %)**	1* (9.1 %)	6 (54.5 %)	11 (100.0 %)
Total	7 (14.6 %)	2 (4.2 %)	40 (83.3 %)	48 (100.0 %)

* One participant (P49) had human influence in using both the AskERIC web site and its Q&A Service.

As shown in Table 7-7, five out of 11 participants who had no experience in using any ERIC related systems/services reported that the choice had been recommended by other people (a librarian, classmate, or professor) to use the AskERIC website for the IPS. On the other hand, only one participant who had no experience in using the AskERIC Q&A Service but had experience in using the ERIC database reported that her professor suggested that she use the ERIC database on the AskERIC website for the IPS.

Thus, the selection of information sources in self-searching seems to be determined in the following ways:

- Information sources used in self-searching are determined by use experience.
- Human influence is associated with the selection of novel information sources in self-searching.

[13] Interview question Q10 asked: "Please describe your situation at the moment just before you sent the question/request to AskERIC. Again, please tell me what you actually thought felt or did.

Above findings suggest that positive experience in using a particular information source might be associated with the priority of information sources used in IPS processes. The study's findings also imply that users develop a relatively clear and positive mental model of the system or service after using it. Thus users' choice of a particular human intermediation and tasks they request of the intermediaries might be determined by users' immediate goal and the mental model they have of the human intermediation.

Time Factors in Self-Searching

The concept of *time* seems to be an important factor in controlling self-searching behavior. Time-related reasons were reported by a majority of participants who did self-searching before sending requests.

Availability of free or uninterrupted time was reported by three participants as a reason to start self-searching. All of them did not have any specific deadline for the IPS. For example, one participant began self-searching in a hotel room in order to kill time. Similarly, a principal of an elementary school articulated that she did self-searching in her work office on a "snow day" because of the availability of uninterrupted time. Thus, some people may engage in self-searching for non-urgent information problems to kill or spend time.

Five participants reported that they did self-searching at home because they did not want to go to libraries for the IPS mainly because they did not have time, or did not want to invest their time in going to libraries. Similarly, two college faculty members said they did self-searching in their offices because they thought going to libraries for information was a waste of time. Thus, some people do self-searching at home or in their office due to their perception of going to a library as wasting time.

Self-searching was considered to be a time-consuming activity. Eight participants articulated that they thought self-searching on the Internet and/or the ERIC database took a very long time. A school psychologist who was looking for information to fulfill her job responsibility performed self-searching at home because she thought it would take too long a time to do it at her work place. Thus, some people may conduct self-searching for a job-related IPS at home because they consider that self-searching may take an unpredictable amount of time and that they have more uninterrupted free time at home than at their work place.

Close deadlines accompanied with an imposed IPS goal were identified as associated with severe time pressure perceived by seven participants who did self-searching before sending requests to the AskERIC Q&A Service. One of them changed her topic because of self-searching failure on top of perceived time-pressure. Thus, severe time-pressure associated with close deadlines may cause a modification of information needs.

Seven participants reported that they stopped searching and decided to send a request to AskERIC because there was a crunch on available time. Another participant indicated that she stopped self-searching at the point when she sent a request to the AskERIC Q&A Service because she felt she had spent enough time in self-searching. Thus, perceived time-limitation, in terms of the crunching of available time, seems to be associated with the termination of self-searching.

Thus, time concerns seem to be related to self-searching behavior in the following ways:

- Participants tended to engage in self-searching when free or uninterrupted time is available, if the IPS is not accompanied by a close deadline.
- Participants tended to conduct self-searching at home and/or office, rather than going to libraries, due to time-limitation. They considered going to libraries for IPS activities a waste of time.
- Participants tended to think self-searching as a time-consuming activity.
- Some participants perceived they were wasting time by self-searching.
- Perception of wasting time tended to generate frustration with self-searching.
- Participants tended to perform self-searching at home for work-related IPS when they believe it would take an unpredictably large amount of time and that they had more free time at home than at work.
- Close deadline of IPS generates severe time pressure that may lead to a modification of information need.
- Perceived limitation of time was associated with the termination of self-searching.

Place and Convenience

Place or location of participants was identified as associated with perception of convenience. Nine participants reported that they did self-searching at home or at a work place because of the perceived convenience of conducting IPS activities at one place without going out. Thus, the place where participants did self-searching seems to be associated with their perception of convenience of using information technology, which allowed them to perform IPS activities in any place.

The place where self-searching is done seems to be associated with convenience of IT as follows:

- Participants perform self-searching using information technology because it allows them to conduct IPS activities at a convenient location.

SUMMARY OF SITUATIONAL FACTORS ASSOCIATED WITH SELF-SEARCHING

Table 7-8 summarizes the findings concerning situational factors associated with the part of the self-searching process that occurred before making requests of the AskERIC Q&A Service. As shown in Table 7-8, situational factors in all four categories (cognitive, affective, social and environmental) were found to be associated with participants' IPS process.

Table 7-8: Factors Associated with Self-Searching

	Factors	Associations
Internal States	Cognitive State - Perceived level of IPS skill	• Perceived level of IPS skill was positively associated with confidence in self-searching. • The low level of IPS skill was associated with the need for help in libraries and self-searching. • Participants with a high level of perceived IPS skill had less emotional involvement in self-searching
	Affective State -Emotion in self-searching	• Participants' affected states shifted from positive -> negative -> positive in self-searching associated with self-searching failure, a low level of perceived IPS skill, and severe time pressure. • Positive feeling was associated with availability of human help in self-searching.
	-Opportunistic hope	• Opportunistic hope leads participants to situated actions including selection of unknown information sources and changes in IPS goals. • Opportunistic hope is associated with encountering the AskERIC Q&A Service in self-searching.
External Contexts	Social Contexts -Experience with ERIC & AskERIC Q&A	• Experience was associated with selection of information sources in self-searching.
	-Human influence	• Human influence was associated with selection of unknown information sources in self-searching.
	-Time concerns	• Initiation of self-searching was associated with availability of free/uninterrupted time. • Perception of wasting time with self-searching was associated with negative emotion in self-searching. • A close deadline of IPS was associated with a perception of severe time pressure in self-searching • Perceived limitation of time was associated with the termination of self-searching.
	Physical Environment -Place	• Place of self-searching was associated with perception of convenience. • Place of self-searching was associated with perceived time-limitation.

SITUATIONAL FACTORS ASSOCIATED WITH EXPERIENCE IN USING ASKERIC Q&A SERVICE

Reasons for selecting the AskERIC Q&A Service are associated with participants' *experience in using the AskERIC Q&A Service*. As described above, participants' experience in using ERIC database and the AskERIC Q&A Service seem to be associated with planned use of them. Findings also implied that participants' self-searching

before sending the requests was associated with the complexity of reasons for selecting the AskERIC Q&A Service. Thus, reasons for selecting the AskERIC Q&A Service were compared with participants' experience of using the AskERIC Q&A Service and the ERIC database.

GENERAL PATTERNS OF ASSOCIATIONS BETWEEN EXPERIENCE AND REASONS

Reasons for using the AskERIC Q&A Service were analyzed by participants' experience. In this analysis, participants were categorized into three groups: (b1) those who had experience in using the AskERIC Q&A Service (n=19); (b2) those who had no experience in using the AskERIC Q&A Service but had experience in using the ERIC database (n=26); and (b3) those who had no experience in using any ERIC-related services/systems (n=17). Table 7-9 presents the number of participants (over two) in each group who reported each reason. Reasons unique to each group, as well as reasons that were not articulated by participants in the group but articulated by those in other groups, are presented in bold.

The percentage of participants who reported C7: POSITIVE IMAGE OF THE ASKERIC Q&A SERVICE, a reason articulated by a majority of participants, is different among the three groups. As shown in Table 7-9, an overwhelming majority of participants in group b1 (those who had experience in using the Q&A Service) and about half of group b2 (those who had no experience in using the Q&A Service but had experience in using the ERIC database and/or the AskERIC website) reported it as a reason for selecting the service. On the other hand, only about a third of participants in the group b3 (those who had no experience in using ERIC related services/systems) reported it as a reason for choosing the service. This difference might be a reflection of the possible relationship between participants' *experience* and their *mental model* of the service. Thus, the construct of C7: POSITIVE IMAGE OF THE ASKERIC Q&A SERVICE was further analyzed. The result is presented in the next section.

ASSOCIATION BETWEEN EXPERIENCE AND POSITIVE IMAGE OF THE SERVICE

The construct of C7: POSITIVE IMAGE/ATTITUDE OF THE ASKERIC Q&A SERVICE was developed through constant comparative analysis of interview data by combining the 11 sub-categories shown in Table 7-10[14]. The relation between these sub-categories of this construct and participants' experience of using the AskERIC Q&A Service were analyzed and some patterns of associations were identified between them.

As presented in the last row of Table 7-10, participants who had experience in using the AskERIC Q&A Service (b1) reported, on average, the largest number (1.3) of sub-categories, while those who had no experience in using ERIC-related systems/services (b2) reported the least number (0.6). This suggests that the number of

[14] Definitions of each sub-category are provided in Appendix B4.

Table 7-9: Association between Reason and Participants' Experience (N=62)

Category	Code / Experience	b1: AskERIC* (n=19)	b2: ERIC** (n=26)	b3: No*** (n=17)	Total (N=62)
A: IPS PROCESSES	A1 PLANNED USE	2	**0**	1	3
	A2 SELF-SEARCHING FAILURE	6	12	5	23
	A3 ENCOUNTER-ASKERIC	**0**	15	7	22
	A4 HABITUAL USE	7	0	0	7
	A5 TRYING NEW SOURCE	**0**	2	1	3
	A6 EXHAUSTED SOURCES	1	1	**0**	2
	A7 ERIC SEARCH	3	4	4	11
	A8 INTERNET SEARCH	2	7	4	13
B: INFORMATION NEEDS	B1 NEED INFORMATION	3	3	3	9
	B2 VERIFY OWN SEARCH	**2**	0	0	2
	B3 NEED HELP IN IPS	2	6	2	10
	B4 TESTING SERVICE	**0**	4	1	5
C: COGNITIVE STATES	C1 KNOW ASKERIC	0	2	0	2
	C2 KNOW ERIC	**0**	2	1	3
	C3 LIMITED IPS SKILL	2	5	5	12
	C4 REMEMBER ASKERIC	1	2	0	3
	C5 REMEMBER ERIC	**0**	3	1	4
	C6 TOPIC/DOMAIN MATCHED	3	6	3	12
	C7 POSITIVE IMAGE OF ASKERIC	16	13	6	35
	C8 POSITIVE IMAGE OF ERIC	3	7	1	11
	C9 NEGATIVE IMAGE OF LIBRARIES	2	1	**0**	3
	C10 NEGATIVE IMAGE OF INTERNET	2	2	3	7
	C11 LOGICAL CHOICE	**0**	1	2	3
	C12 INTUITION	1	1	**0**	2
D: AFFECTIVE STATES	D1 FRUSTRATION OF SELF-SEARCHING	1	4	3	8
	D2 OPPORTUNISTIC HOPE	**0**	5	6	11
	D3 NOTHING TO LOSE	**0**	2	1	3
E: SOCIAL CONTEXTS	E1 IMPOSITION OF ASKERIC	0	0	**3**	3
	E2 IMPOSITION OF ERIC	**0**	1	2	3
	E3 GOOD EXPERIENCE ASKERIC	**13**	0	0	13
	E4 GOOD EXPERIENCE ERIC	2	9	**0**	11
	E5 GOOD EXPERIENCE WITH HUMAN INTERMEDIARY	1	1	0	2
	E6 HUMAN INFLUENCE ASKERIC	2	4	3	9
	E7 HUMAN INFLUENCE ERIC	**0**	1	3	4
	E8 REPUTATION ASKERIC	2	3	**0**	5
	E9 MEDIA INFLUENCE ASKERIC	1	1	3	5
	E10 TIME LIMITATION	1	5	1	7
F: ENVIRONMENTAL CONDITIONS	F1 CONVENIENCE	3	4	3	10
	F2 BOOKMARKED	1	1	1	3
	F3 ASKERIC AVAILABLE	2	2	2	6
Average # of reasons		87/19 = 4.6	150/26 = 5.8	83/17 = 4.9	320/62 = 5.2

* Participants who had experience in using the AskERIC Q&A Service. Reasons unique to this group as well as reasons not articulated only by this group are shown in bold under this column.

** Participants who had no experience in using the AskERIC Q&A Service, but had experience in using the ERIC database and/or the AskERIC website. Reasons unique to this group as well as reasons not articulated only by this group are shown in bold under this column.

*** Participants who had no experience of using ERIC related system/service. Reasons unique to this group as well as reasons not articulated only by this group are shown in bold under this column.

Table 7-10: Association between Positive Image of AskERIC and Experience (N=62)

	Experience			
Sub-categories	b1. Experience Q&A (n=19)	b2. Experience ERIC (n=26)	b3. No Experience (n=17)	Total (N=62)
RELIABLE/TRUSTFUL	9 (47.4 %)	1 (3.9 %)	0	10 (16.1 %)
TIME-SAVINGS	5 (26.3 %)	3 (11.5 %)	1 (5.9 %)	9 (14.5 %)
USEFUL/HELPFUL	5 (26.3 %)	2 (7.7 %)	1 (5.9 %)	8 (12.9 %)
SKILLED INTERMEDIARIES	0	6 (23.1 %)	2 (11.8 %)	8 (12.9 %)
CAN ASK QUESTION	0	3 (11.5 %)	3 (17.7 %)	6 (9.7 %)
HIGH QUALITY	1 (5.3 %)	5 (19.2 %)	0	6 (9.7 %)
EASY	1 (5.3 %)	2 (7.7 %)	1 (5.9 %)	4 (6.5 %)
FAMILIAR	2 (10.5 %)	0	0	2 (3.2 %)
RESPOND	2 (10.5 %)	0	0	2 (3.2 %)
GOOD SEARCH TOOL	0	1 (3.9 %)	1 (5.9 %)	1 (1.6 %)
FREE	0	0	1 (5.9 %)	1 (1.6 %)
Average # of sub-categories per participant	25/19 = 1.3	22/26 = .9	10/17 = .6	59/62 = .10

sub-categories of the image of the AskERIC Q&A Service reported by participants in each experience group reflects the level of the comprehensiveness of the *mental model* of the service developed in their minds. In general, participants who had experience in using the service (b1) seemed to have developed a more comprehensive mental model of the service, compared to those who had no experience of using it.

Table 7-10 also implies that the nature of the image or the *mental model of the Q&A Service* was somewhat different depending upon participants' experiences. The following characteristics of the mental models of the AskERIC Q&A Service were shared among participants in each experience group.

- Participants who had experience in using the AskERIC Q&A Service (b1) tended to consider the service as reliable, time-savings, and useful, based on their good experience. Some of them felt familiar with the service and anticipated that it would respond. The reliability and familiarity they had with the service may reflect an attachment they developed through their experiences with using the service.

- Participants who had experience in neither the AskERIC website nor the ERIC system (b3) seemed to have developed a minimal mental model at the time they encountered the service. Data instances suggest that they just appreciated the fact that they could ask questions rather than trying keyword searching, particularly when they were not very familiar with Internet searching and did not know relevant websites to search.

These observations suggest that participants' *experience in using the AskERIC Q&A Service* not only helped develop a more elaborate *mental model* of the service, but also some *attachment*, such as familiarity, reliance, and trust of the service. On the other hand, participants who did not have any experience in using the ERIC-related system/service did not have developed any image or mental *model of the Q&A Service*. They might have generated a positive image of the service, such as CAN ASK QUESTION and TIME-SAVINGS, at the time when they encountered the service.

As reported earlier in this section, *experience in using the AskERIC Q&A Service* was also associated with A4: HABITUAL USE of the service. Thus, the study concludes that multiple experiences in using the service may lead to the development of a more elaborate *mental model* of the service, *attachment* toward the service, and lead participants to become *habitual users* of the service.

SITUATIONAL FACTORS ASSOCIATED WITH PERCEIVED LEVEL OF IPS SKILL

The association between reasons for using the AskERIC Q&A Service and participants' *perceived level of IPS skill* was analyzed. Participants were categorized into three groups: (c1) those who had a high level of perceived IPS skill (n=32); (c2) those who had a medium level of perceived IPS skill (n=15); and (c3) those who had a low level of perceived IPS skill (n=8).

Table 7-11 presents the reasons for using the AskERIC Q&A Service reported by two or more participants. Since seven participants did not provide enough data to determine their perceived level of IPS skill, they were excluded from this analysis, and captured as "Unknown." In Table 7-11, reasons unique to each group, as well as reasons that were not articulated by participants in the group are presented in bold.

As shown in Table 7-11, reasons unique to the group c1 participants (those who had a high level of perceived IPS skill) are E8: REPUTATION of the service, service was F2: BOOKMARKED, A5: TRYING NEW SOURCE, A6: EXHAUSTED SOURCES in self-searching, and B2: VERIFYING OWN SEARCH. These reasons imply that participants with a high level of perceived IPS skill may be more aware about the reputation of Internet sources, have developed a habit of bookmarking high-potential Internet sources for future use, and are more interested in testing new sources, compared to those who had a lower level of perceived IPS skills. In addition, some participants with a high level of perceived IPS skill seem to have developed a habit of performing self-searching until they exhaust potential sources, and then sending requests in order to verify their own search results.

Table 7-11: Association Between Reasons and Perceived IPS Skill (N=62)

Category	Perceived Level of IPS Skill Code	C1: High (n=32)	C2:Medium (n=15)	C3: Low (n=8)	Unknown (n=7)*	Total (N=62)
A: IPS PROCESS	A1 PLANNED USE	2	1	0	0	3
	A2 SELF-SEARCHING FAILURE	10	7	3	3	23
	A3 ENCOUNTER ASKERIC	8	6	4	4	22
	A4 HABITUAL USE	5	2	0	0	7
	A5 TRYING NEW SOURCE	3	0	0	0	3
	A6 EXHAUSTED SOURCES	2	0	0	0	2
	A7 ERIC SEARCH	4	1	3	3	11
	A8 INTERNET SEARCH	7	3	1	2	13
B: INFORMATION NEEDS	B1 NEED INFORMATION	5	1	1	2	9
	B2 VERIFY OWN SEARCH	2	0	0	0	2
	B3 NEED HELP IN IPS	4	3	2	1	10
	B4 TESTING SERVICE	5	0	0	0	5
C: COGNITIVE STATES	C1 KNOW ASKERIC	1	0	0	1	2
	C2 KNOW ERIC	2	0	0	1	3
	C3 LIMITED IPS SKILL	3	5	4	0	12
	C4 REMEMBER ASKERIC	3	0	0	0	3
	C5 REMEMBER ERIC	3	0	0	1	4
	C6 TOPIC/DOMAIN MATCHED	8	2	1	1	12
	C7 POSITIVE IMAGE OF ASKERIC	18	10	5	2	35
	C8 POSITIVE IMAGE OF ERIC	9	1	1	0	11
	C9 NEGATIVE IMAGE OF LIBRARIES	2	1	0	0	3
	C10 NEGATIVE IMAGE OF INTERNET	3	2	2	0	7
	C11 LOGICAL CHOICE	0	2	0	1	3
	C12 INTUITION	2	0	0	0	2
D: AFFECTIVE STATES	D1 FRUSTRATION OF SELF-SEARCHING	0	4	2	2	8
	D2 OPPORTUNISTIC HOPE	4	3	3	1	11
	D3 NOTHING TO LOSE	1	2	0	0	3
E: SOCIAL CONTEXTS	E1 IMPOSITION OF ASKERIC	1	1	1	0	3
	E2 IMPOSITION OF ERIC	2	0	1	0	3
	E3 GOOD EXPERIENCE ASKERIC	7	4	1	0	13
	E4 GOOD EXPERIENCE ERIC	7	2	0	2	11
	E5 GOOD EXPERIENCE WITH HUMAN INTERMEDIARY	0	1	1	0	2
	E6 HUMAN INFLUENCE ASKERIC	3	4	1	2	9
	E7 HUMAN INFLUENCE ERIC	1	1	2	0	4
	E8 REPUTATION ASKERIC		0	0	0	5
	E9 MEDIA INFLUENCE ASKERIC	4	0	1	0	5
	E10 TIME LIMITATION	3	2	1	1	7
F: ENVIRONMENTAL CONDITIONS	F1 CONVENIENCE	6	4	1	0	10
	F2 BOOKMARKED	3	0	0	0	3
	F3 ASKERIC AVAILABLE	2	1	3	0	6
Average number of reasons per participant		166/32=5.2	80/15=5.3	46/8=5.8	32/7=4.6	321/62=5.2

*Perceived level of IPS skill was not available due to incomplete data

It should be worth noting that two participants who said they used the service to B2: VERIFY THEIR OWN SEARCH also have a high level of perceived IPS skill, did self-searching before sending the requests, and had experience in using the service. This implies that using the service for verification purposes may be a behavior unique to those who had a high level of perceived IPS skill, experience in using the service, and who did self-searching before sending the request.

Interestingly, no participants with a high level of perceived IPS skill reported D1: FRUSTRATION WITH SELF-SEARCHING as a reason for selecting the Q&A Service even though their self-searching was not always successful. This implies that participants with a high level of perceived IPS skill are less likely to have a negative emotion in self-searching compared to those with a lower level of perceived IPS skills.

SUMMARY

This chapter reported the study's findings concerning participants' reasons for using the AskERIC Q&A Service and provided some answers to the research question RQ2: *what situational factors do users perceive to be salient when they make requests of human intermediaries?*

Reasons articulated by participants for selecting the AskERIC Q&A Service were found to have complex associations among themselves, demonstrating a very complex nature of human information behavior. The causal and temporal relationships identified among reasons imply the support for a reciprocal causation among three situational factors of IPS behavior, internal states, and external contexts, indicating the applicability of Bandura's (1986) social cognitive theory on IPS behavior.

Three variables were found to have relatively clear patterns of associations with other situational factors: *self-searching before sending requests*, *experience in using the service*, and *perceived level of IPS skill*.

Patterns of associations among situational factors observed in self-searching are:

- During self-searching, participants' feelings generally shifted from positive to negative and were then supplanted by positive feelings when they got human help and/or decided to use the AskERIC Q&A Service. The negative emotion in self-searching was found to be associated with self-searching failure, a low level of perceived IPS skill, and severe time pressure.

- A majority of participants who did self-searching and had no experience using the service referred to *encountering the service* during self-searching as a reason for selecting the service. Many of them articulated an *opportunistic hope* (an optimistic but ambivalent feeling) as another reason for selecting the service. This suggests that *opportunistic hope* accompanied with *encountering* is a motivational factor that introduces situated actions, such as the selection of unknown sources and/or changes of user goals, into human IPS processes.

- The concept of time was identified as an important element in the self-searching processes. The initiation of self-searching was identified as associated with the availability of free/uninterrupted time. The limitation of available time, or a time crunch, was identified as associated with the termination of self-searching and the decision to use the AskERIC Q&A Service. The close deadline of IPS seems to generate the severe time-pressure in self-searching, and both the perceived time pressure and perception of wasting time for self-searching was identified to be associated with frustration.

- The places where participants performed self-searching as well as the places from which they sent requests were associated with perceived convenience.

Participants' *experience in using the AskERIC Q&A Service* was identified as associated with the *clarity of the mental model of the service* and the *attachments* they had towards it. The variable of whether participants had *experience using a source* was found to be associated with *human influence*. Only those participants who had no experience in using the ERIC database reported human influence as a reason for selecting it for self-searching, and only those participants who had no experience in using the AskERIC Q&A Service reported human influence as a reason for selecting the Q&A Service.

The variable of the *perceived level of one's own IPS skill* was found to be associated with *affective states* and other factors related to the self-searching processes in following ways:

- Participants who had a high level of perceived IPS skill tended to have less emotional involvement in self-searching, while those with a low level of perceived IPS skill tended to have negative emotions throughout self-searching. Participants with a high level of perceived IPS skill seemed to have tendencies to use the service after exhausting all sources in self-searching, and to bookmark Internet sources for future use. They tended to be more aware about the reputation of information sources, and were interested in testing unknown reputable Internet sources. Some participants who had a high level of perceived IPS skill and had experience using the service tended to use it for verification of their own search, rather than for locating information.

- Participants with a low level of perceived IPS skill generally needed help in self-searching of the Internet sources as well as in libraries. They always asked for and used the help of other people including librarians, colleagues, and family members whenever available.

By capturing dynamic variables in the framework of the triadic reciprocal model of behavior, internal states, and external conditions, the study identified potentially important situational variables that might be related to IPS behavior in general, and use of human intermediation in particular, for all three categories of factors:

External factors: ***imposition*** of IPS goals, topic of search, and information sources; ***social influence*** of generating IPS goals, biases in information needs, and selection of information sources; ***experience*** in using an information source that generates a mental model of the source; availability or limitation of ***time*** in generating information-seeking behavior and affective states; ***availability*** and ***accessibility*** of sources, and ***convenience*** of IT or physical environments.

Internal factors include: ***user goals, mental model*** of information sources including human intermediaries; and ***perceived level of IPS skills*** in uses of human help and ***affective states*** in IPS processes.

IPS processes (behavioral) factors include: ***searching behavior*** (e.g., self-searching, human intermediation, etc.) and its outcome (e.g., ***self-searching failure***) in generating emotion and determining alternative avenues in subsequent IPS processes; ***source encountering*** and ***information encountering*** that may generate affective states and introduce situated actions in IPS processes.

Recognition of potential impacts of external factors of social situations and environmental conditions on human information behavior in IPS processes, as described above, might also underline the importance of consciously accounting for these external factors in user-based IR and IPS research.

CHAPTER EIGHT

EVALUATION OF ASKERIC Q&A SERVICE

This chapter reports the study's findings concerning participants' evaluation of responses or information obtained from the AskERIC Q&A Service. First, the quantitative evaluation using the evaluation and satisfaction scores reported by participants for the outcome of using the AskERIC Q&A Service is discussed. Relation between evaluation and satisfaction scores, as well as patterns of associations between evaluation score and four variables of self-searching before AskERIC, experience of using the service, perceived level of IPS skill, and participants' IPS goal are sought. Second, the taxonomy of evaluation criteria of the AskERIC Q&A Service, developed by qualitative analysis of interview data is presented. The result of applying the final taxonomy in categorizing participants' evaluation measures is reported. Associations between usage pattern of evaluation criteria and four variables of self-searching before AskERIC, experience of using the service, perceived level of IPS skill, and participants' IPS goal are described. Finally, patterns of associations between evaluation score and evaluation criteria are reported.

QUANTITATIVE EVALUATION OF ASKERIC Q&A SERVICE

Participants reported evaluation score and satisfaction score on the outcome of using the AskERIC Q&A Service. This section reports distribution of evaluation and satisfaction scores and relation between them. Patterns of associations identified between evaluation score and four situational variables of whether participants did self-searching before making the requests, whether participants had experience in using the AskERIC, perceived level of IPS skill, and participants' IPS goal are also described.

EVALUATION SCORE

A total of 58 participants reported *evaluation scores* of the AskERIC responses using a scale of 1-10 in which 1 was poor, 5 was average, and 10 was excellent in response to interview question Q21[1]. The distribution of the *evaluation score* is presented in Table 8-1.

Table 8-1: Distribution of Evaluation Score (N=58)

Evaluation Score	Frequency	5 10 15 20 25 30	Percent	Cumulative Percent
1.0 - 1.9	1		1.7 %	1.7 %
2.0 - 2.9	3		5.2 %	6.9 %
3.0 - 3.9	0		0.0 %	6.9 %
4.0 - 4.9	0		0.0 %	6.9 %
5.0 - 5.9	4		6.9 %	13.8 %
6.0 - 6.9	1		1.7 %	15.5 %
7.0 - 7.9	7		12.0 %	27.6 %
8.0 - 8.9	8		13.8 %	41.4 %
9.0 - 9.9	6		10.3 %	51.7 %
10.0	28		48.3 %	100.0 %

As shown in Table 8-1, the *evaluation score* was negatively skewed and concentrated at the high end of the scale (Mean = 8.3; Median = 9.5; SD = 2.36). The study regards this distribution as a bimodal distribution as suggested by Eisenberg (1988) and Janes (1991), in which a majority of data points were concentrated at the high end of the scale (i.e., 10). This distribution implies that a great majority of participants evaluated very positively the responses they received from the service.

SATISFACTION SCORE

A total of 59 participants reported their *satisfaction scores* (the level of satisfaction of using the AskERIC Q&A Service) using a scale of 1-10 in which 1 was least satisfied, 5 was average, and 10 was very satisfied in response to interview question Q22[2]. The resulting distribution of the satisfaction score is presented in Table 8-2.

As presented in Table 8-2, the satisfaction score was negatively skewed and a majority of data points are concentrated at the high end of the scale (Mean = 8.4; Median 10.0; SD = 2.2). This distribution indicates that a great majority of participants were highly satisfied with the use of the service.

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[1] The interview question Q21 asked, "With 1 as poor, 5 as average and 10 as excellent, how would you evaluate the response or information you received from AskERIC?"

[2] The interview question Q22 asked, "With 1 as least satisfied, 5 as average and 10 as very satisfied, how would you rate your level of satisfaction with the use of AskERIC this time?"

Table 8-2: Distribution of Satisfaction Score (N=59)

Satisfaction Score	Frequency	5 10 15 20 25 30	Percent	Cumulative Percent
1.0 - 1.9	1		1.7 %	1.7 %
2.0 - 2.9	1		1.7 %	3.4 %
3.0 - 3.9	0		0.0 %	3.4 %
4.0 - 4.9	0		0.0 %	3.4 %
5.0 - 5.9	7		11.9 %	15.3 %
6.0 - 6.9	1		1.7 %	16.9 %
7.0 - 7.9	5		8.5 %	25.4 %
8.0 - 8.9	9		15.3 %	40.7 %
9.0 - 9.9	5		8.5 %	49.2 %
10.0	30		50.8 %	100.0 %

ASSOCIATION BETWEEN EVALUATION AND SATISFACTION SCORES

Fifty-six participants reported both evaluation and satisfaction scores. The relation between *evaluation score* and *satisfaction score* was examined using SPSS (Standard Version, Release 9.0.0), and identified a very high level of correlation between the two (r = .80) in terms of the Pearson's product moment correlation. Among the 56 participants who reported both scores, almost two-third gave the same score for both measures, and almost a quarter reported different scores within a range of one point. They also reported the same or similar reasons in response to probe questions (i.e., "Why?") of interview questions Q21 and Q22: On the other hand, the remaining eight participants articulated two different scores with more than one point difference. Some differences between reasons for each of the two scores were identified. Summaries of reasons for the difference between two the scores for these eight participants are provided in Table 8-3.

Table 8-3: Reasons for Difference between Evaluation and Satisfaction Scores

Participant	Evaluation score	Satisfaction score	Reason for Difference
P8	10	8	Information provided led the participant to needed data, but the satisfaction of using the service was not very high because the keyboard was broken while using the service.
P11	10	7	Information provided was useful but the participant was not very satisfied because it did not include the specific data she requested.
P16	2	5	The response was poor because it implied that a lot of work was necessary to obtain the needed information, but he was neither satisfied nor dissatisfied with using the service because the intermediary seemed to have done his best.
P28	2	9	The response was poor because it did not match the type of information she requested, but satisfied with using the service because the response was timely.
P56	7	5.5	The participant received more information than expected, but the level of satisfaction was on an average because she did not follow-up yet to be able to evaluate the usefulness.
P59	10	8.5	Response was timely, but information provided did not match the type of information she requested.
P60	9.5	5	Information provided was exhaustive, but did not include the data she requested.
P65	7.5	9	The request message itself was poor, but the participant found some useful information in the response.

These reasons suggest the following:

- Even when participants gave very low evaluation scores for responses they received from the AskERIC Q&A Service, they might be satisfied with their use of the service because of its quick response or an indication that the intermediary did her/his best to help them.

- Participants did not have a high level of satisfaction if the responses did not include the type of information they requested, even when information provided was regarded to be excellent.

- Exact level of satisfaction attained by participants with the use of the service may be determined based not on the responses *per se*, but on the usefulness of information provided by the service in the rest of IPS processes, that can only be judged after completing the entire IPS process.

Considering the possibility of difficulty in judging the level of satisfaction without completing the IPS process, the *evaluation score*, rather than *satisfaction score* or a combination of both scores was used in the rest of the analysis of participants' evaluation of the AskERIC Q&A Service. Hence, less than half of participants had completed their IPS processes at the time of the interview.

ASSOCIATION BETWEEN EVALUATION SCORE AND SITUATIONAL FACTORS

The distribution of the evaluation score was compared with four situational variables including (1) whether participants did self-searching before making the requests of AskERIC; (2) whether participants had experience in using the AskERIC Q&A Service; (3) perceived level of IPS skill; and (4) participants' IPS goal category.

Association between Self-Searching before AskERIC and Evaluation Score

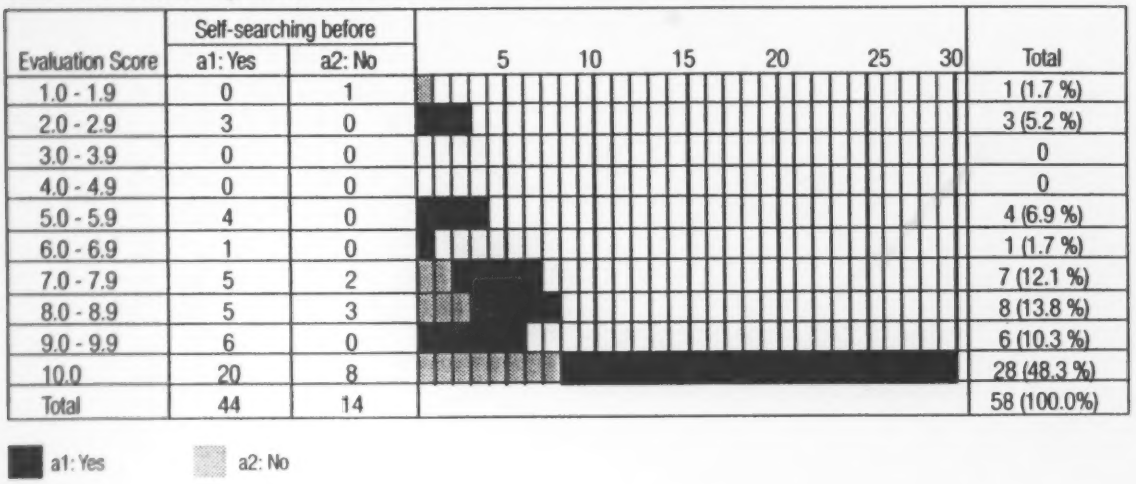
Table 8-4 presents central tendencies of the *evaluation score* for participants who did self-searching before making requests of the AskERIC Q&A Service (a1) and those who did not (a2). Table 8-5 shows the distribution of the evaluation score for these two groups.

Table 8-4: Self-Searching before AskERIC and Central Tendencies of Evaluation Score (N=58)

	Central Tendency			
Self-searching before AskERIC	Frequency	Mean	SD	Median
a1: Yes	46	8.3	2.31	9
a2: No	12	8.5	2.61	10
Total	58	8.3	2.36	9.5

Table 8-5: Self-Searching before AskERIC and Distribution of Evaluation Score (N=58)

Evaluation Score	Self-searching before		Total
	a1: Yes	a2: No	
1.0 - 1.9	0	1	1 (1.7 %)
2.0 - 2.9	3	0	3 (5.2 %)
3.0 - 3.9	0	0	0
4.0 - 4.9	0	0	0
5.0 - 5.9	4	0	4 (6.9 %)
6.0 - 6.9	1	0	1 (1.7 %)
7.0 - 7.9	5	2	7 (12.1 %)
8.0 - 8.9	5	3	8 (13.8 %)
9.0 - 9.9	6	0	6 (10.3 %)
10.0	20	8	28 (48.3 %)
Total	44	14	58 (100.0%)



As shown in Table 8-4 and Table 8-5, not much difference can be observed between the two groups either in the central tendencies or distribution patterns of the evaluation score. The analysis suggests that there is no association between participants' *self-searching before sending requests* to the AskERIC Q&A Service and the *evaluation score* they reported.

Association between Experience in the AskERIC Q&A Service and Evaluation Score

Table 8-6 presents central tendencies of the *evaluation score* for participants (b1) who had experience in using the AskERIC Q&A Service and (b2) those who had not. Table 8-7 shows the distribution of the evaluation score for the two groups.

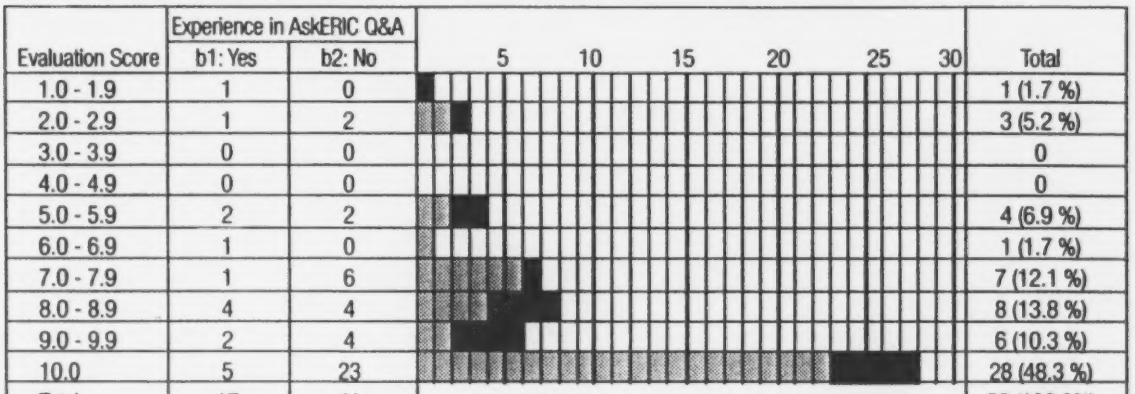
As shown in Table 8-6, the mean and median of the evaluation score of those who had experience in using the service (b1) tend to be lower compared to the other group. The distribution of the evaluation score, presented in Table 8-7, also shows that the evaluation score of participants who had no experience in using

Table 8-6: Experience in Using the AskERIC Q & A Service and Central Tendencies of Evaluation Score (N=58)

Experience in AskERIC Q&A	Central Tendency			
	Frequency	Mean	SD	Median
b1: Yes	17	7.4	2.81	8.0
b2: No	41	8.7	2.08	10.0
Total	58	8.3	2.36	9.5

Table 8-7: Experience in Using the AskERIC Q&A Service and Distribution of Evaluation Score (N=58)

Evaluation Score	Experience in AskERIC Q&A		Total
	b1: Yes	b2: No	
1.0 - 1.9	1	0	1 (1.7 %)
2.0 - 2.9	1	2	3 (5.2 %)
3.0 - 3.9	0	0	0
4.0 - 4.9	0	0	0
5.0 - 5.9	2	2	4 (6.9 %)
6.0 - 6.9	1	0	1 (1.7 %)
7.0 - 7.9	1	6	7 (12.1 %)
8.0 - 8.9	4	4	8 (13.8 %)
9.0 - 9.9	2	4	6 (10.3 %)
10.0	5	23	28 (48.3 %)
Total	17	41	58 (100.0%)



the service (b2) tends to be more concentrated at the high end of the scale. The analysis suggests that participants who had *experience in using the service* tended to give a lower *evaluation score* compared to those who had no experience in using the service.

Association between Perceived Level of IPS Skill and Evaluation Score

Table 8-8 presents central tendencies of the *evaluation score* for participants (c1) who had a high level of perceived IPS skill, (c2) those who had a medium level of perceived IPS skill, and (c3) those who had a low level of perceived IS skill. Table 8-9 shows the distribution of the evaluation score for these three groups.

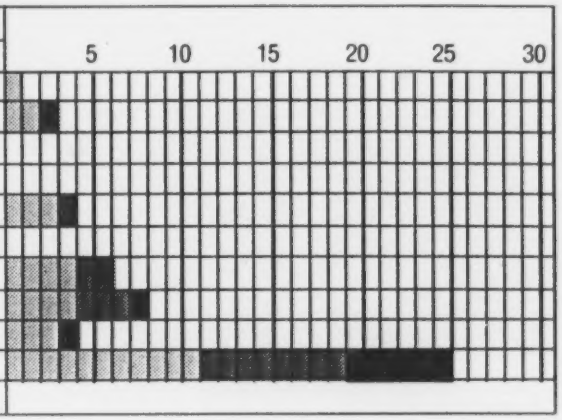
As shown in Table 8-8, the mean and median of the *evaluation score* of those with a high level of perceived IPS skill tends to be lower compared to those who had a lower level of perceived IPS skill. The distribution of the evaluation score, presented in Table 8-9, also shows that the evaluation score of participants who had

Table 8-8: Perceived Level of IPS Skill and Distribution of Evaluation Score (N=58)

Perceived Level of IPS Skill	Central Tendency			
	Frequency	Mean	SD	Median
c1: High	28	7.8	2.71	8.5
c2: Medium	15	8.3	2.35	10.0
c3: Low	8	9.6	0.74	10.0
Unknown	7	8.8	1.52	9.0
Total	58	8.3	2.36	9.5

Table 8-9: Perceived Level of IPS Skill and Distribution of Evaluation Score (N=58)

Evaluation Score	Perceived IPS skill			
	c1: High	c2: Medium	c3: Low	Unknown
1.0 - 1.9	1	0	0	0
2.0 - 2.9	2	1	0	0
3.0 - 3.9	0	0	0	0
4.0 - 4.9	0	0	0	0
5.0 - 5.9	3	1	0	0
6.0 - 6.9	0	0	0	1
7.0 - 7.9	4	2	0	1
8.0 - 8.9	4	3	1	0
9.0 - 9.9	3	0	1	2
10.0	11	8	6	3
Total	28	15	8	7



c1: High c2: Medium c3: Low

a low level of perceived IPS skill tended to be more concentrated at the high end of the scale. The analysis suggests that the *perceived level of IPS skill* tended to be negatively associated with the *evaluation score* – participants who had a higher level of perceived IPS skill tended to give a lower evaluation score compared to those who had a lower level of perceived IPS skill.

Association between IPS Goal and Evaluation Score

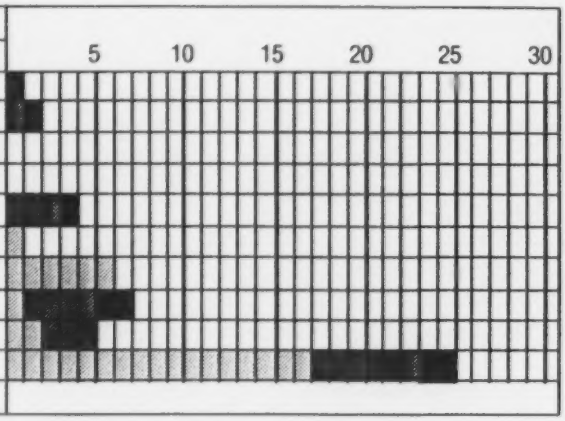
Table 8-10 presents central tendencies of the *evaluation score* reported by participants with (d1) a degree-seeking goal; (d2) a decision/action-planning goal; and (d3) a teaching goal. Table 8-11 shows the distribution of the evaluation score for these three groups.

Table 8-10: IPS Goal and Central Tendencies of Evaluation Score (N=58)

Goal Category	Central Tendency			
	Frequency	Mean	SD	Median
d1:DEGREE SEEKING	27	9.1	1.35	10.0
d2: DECISION/ACTION PLANNING	18	7.6	2.85	8.5
d3: TEACHING	7	7.6	3.05	8.0
Other	6	7.7	3.01	8.5
Total	58 (100.0 %)	8.3	2.36	9.5

Table 8-11: IPS Goal and Distribution of Evaluation Score (N=58)

Evaluation Score	Goal Category			
	d1	d2	d3	Other
1.0 - 1.9	0	1	0	0
2.0 - 2.9	0	1	1	1
3.0 - 3.9	0	0	0	0
4.0 - 4.9	0	0	0	0
5.0 - 5.9	0	3	1	0
6.0 - 6.9	1	0	0	0
7.0 - 7.9	6	0	0	1
8.0 - 8.9	1	4	2	1
9.0 - 9.9	2	3	0	1
10.0	17	6	2	2
Total	27	18	7	6



d1: Degree Seeking d2: Desision/Action Planning d3: Teaching

As shown in Table 8-10, the mean and median of the *evaluation scores* of participants with a degree-seeking goal tend to be higher compared to those of other two groups. The distribution of the evaluation scores, presented in Table 8-11, also shows that the evaluation scores of participants with a degree-seeking goal tend to be more concentrated at the high end of the scale. This suggests that there is some association between participants' *IPS goal category* and their *evaluation scores*. Participants who had a degree-seeking goal tended to give a higher evaluation score compared to other two groups.

QUALITATIVE EVALUATION OF ASKERIC Q&A SERVICE

The taxonomy of evaluation criteria of the AskERIC Q&A Service was developed based on content analysis of interview data, using Taylor's (1986) *value-added criteria* (Appendix B5) as the initial framework. The final taxonomy was applied to categorize participants' evaluation measures. Distribution of evaluation criteria used by participants were compared with four situational variables of (1) whether participants did self-searching before making requests of AskERIC, (2) whether participants had experience in using the service, (3) perceived level of IPS skill, and (4) participants' IPS goal.

USER-BASED EVALUATION CRITERIA OF ASKERIC Q&A SERVICE

Table 8-12 presents the taxonomy of evaluation criteria of the AskERIC Q&A Service developed from the content analysis of interview data. Participants articulated reasons for reporting a particular evaluation score in response to a probing question (i.e., "Why?") of interview question Q21[3] and elsewhere during the interview. A top-down strategy of content analysis with the constant comparative technique was employed by using Taylor's value-added criteria (Appendix B5) as the initial framework in analyzing the interview data. An inductive strategy was introduced whenever the initial framework did not adequately categorize data instances of evaluation measures articulated by the participants. As a result, 31 evaluation measures were identified and grouped into nine categories of evaluation criteria. On average, one participant used 4.8 different evaluation measures, of which 3.1 could be interpreted as positive and 1.6 could be interpreted as negative.

COMPARISON WITH TAYLOR'S VALUE-ADDED CRITERIA

Taylor's (1986) *Value-added Criteria* include 25 values or evaluation measures under six categories (Appendix B5). Among nine categories identified in this study, the first six correspond to Taylor's (1986) six categories of *Value-added Criteria*. This study identified three new categories of evaluation criteria that are not included in the Taylor's framework. They are: 7.QUANTITY OF INFORMATION, 8.DRI FEATURES, and 9.USER SITUATIONS. In the following, each evaluation measure identified in this study will be described with its relationship to Taylor's *Value-added Criteria*.

1 Easiness

This criterion corresponds to Taylor's (1986) original criterion of "ease of use." Taylor defined the criterion as having to do "with system elements which, in physical, human, or software terms, tend to reduce difficulty in using the system" (p. 55). This study identified four evaluation measures under this category. They are: 1.1 EASY TO USE, 1.2 MAKE IPS EASIER, 1.3 PHYSICAL ACCESSIBILITY and 1.4 FORMATTING. By including the measure of 1.2 MAKE SEARCH EASIER, the definition of this criterion was expanded from Taylor's original criterion of "ease of using the system" into the "ease of subsequent IPS process as a result of using the service."

1.1 EASY TO USE: Corresponds to the Taylor's criterion "ease of use" itself, and applied to those data instances that indicated perceived ease of use of the AskERIC Q&A Service. All seven data instances assigned this measure used it in a positive sense, implying that participants who cared about the ease of use of the AskERIC Q&A Service evaluated it as easy to use.

[3] The interview question Q21 asked, "With 1 as poor, 5 as average and 10 as excellent, how would you evaluate the response/information you received from AskERIC?" The probe question used to elicit evaluation measures was "Why?"

Table 8-12: User-Based Evaluation Criteria of the AskERIC Q&A Service (N=58)

Category	Measure	Definition	Frequency***
1.EASINESS	1.1 EASY TO USE*	System or service elements that reduce difficulty in accessing or using the system/service. Similar to Taylor's (1986) "ease of use."	P: 7 (12.1 %) N: 0 T: 7: (12.1 %)
	1.2 MAKE IPS EASIER**	Whether the responses or information provided by the service reduce difficulty in subsequent IPS process. Relevant but broader than Taylor's (1986) "ease of use."	P: 4 (6.9 %) N: 1 (1.7 %) T: 5 (8.6 %)
	1.3 PHYSICAL ACCESSIBILITY*	Make access to information easier on physical sense. Equivalent to Taylor's (1986) "physical accessibility."	P: 2 (3.5 %) N: 0 T: (3.5 %)
	1.4 FORMATTING*	The physical presentation and arrangement of data/ information in ways that allow more efficient scanning and hence extraction of items of interest. Equivalent to Taylor's (1986) "formatting."	P: 1 (1.7 %) N: 0 T: 1 (1.7 %)
2.NOISE REDUCTION	2.1 LINKAGE*	Provision of pointers and links to items, sources, and systems external to the system in use, thus expanding the client's information options. Equivalent to Taylor's (1986) "linkage."	P: 23 (39.7 %) N: 3 (5.2 %) T: 26 (44.9 %)
	2.2 ONLINE LINKAGE TO FULLTEXT**	Provision of direct links to fulltext documents in electronic form. A particular kind of Taylor's (1986) "linkage."	P: 0 N: 8 (13.8 %) T: 8 (13.8 %)
	2.3 SELECTIVITY*	Selectivity based on the appropriateness and merit of information chunks to the client's information need. Equivalent to Taylor's (1986) "selectivity."	P: 3 (5.2 %) N: 11 (19.0 %) T: 14 (24.2 %)
	2.4 TYPE OF INFORMATION**	Selectivity based on the type of information required for the client's information need. A particular kind of Taylor's (1986) "selectivity."	P: 22 (37.9 %) N: 13 (22.4 %) T: 35 (60.3 %)
	2.5 SEARCH SKILL OF INTERMEDIARY**	Skill of the intermediary in terms of search technique and selection of vocabulary. Relevant to Taylor's (1986) "precision."	P: 4 (6.9 %) N: 0 T: 4 (6.9 %)
3.QUALITY OF INFORMATION	3.1 COMPREHENSIVENESS*	Completeness of coverage of a particular topic of the search. Equivalent to Taylor's (1986) "comprehensiveness."	P: 8 (13.8 %) N: 0 T: 8 (13.8 %)
	3.2 CORRECTNESS**	Correctness or validity of information or an answer. Relevant to Taylor's (1986) "validity."	P: 2 (3.5 %) N: 1 (1.7 %) T: 3 (5.2 %)
	3.3 DEPTH**	Depth or elaborateness of information or an answer. May be a part of Taylor's (1986) "comprehensiveness." If comprehensiveness or completeness of the coverage of information, use COMPREHENSIVENESS.	P: 2 (3.5 %) N: 1 (1,7 %) T: 3 (5.2 %)
	3.4 CURRENCY*	Currency or recency of information. Equivalent to Taylor's (1986) "currency."	P: 0 N: 1 (2.3 %) T: 1 (2.3 %)
4.ADAPTABILITY	4.1 ANSWER TO THE QUESTION**	Whether the response provided answer to the client's question. May be relevant to Taylor's (1986) "closeness to problem" which is under 'adaptability.'	P: 1 (1,7 %) N: 16 (27.6 %) T: 17 (29.3 %)
	4.2 USEFULNESS**	Usefulness or helpfulness of response or information, including the indication of actual use of information. Relevant to Taylor's (1986) "closeness to problem."	P: 9 (15.5 %) N: 5 (8.6 %) T: (24.1 %)
	4.3 INTERACTIVITY**	Extent of interaction between the client and the intermediary. Relevant to Taylor's (1986) "closeness to problem."	3 (5.2 %) 3 (5.2 %) 6 (10.4 %)
	4.4 CLARITY OF INFORMATION*	Clarity of response or information. Equivalent to Taylor's (1986) 'simplicity.' If clarity of the message rather than information, use TONE OF MESSAGE.	P: 1 (1.7 %) N: 1 (1.7 %) T: 2 (3.5 %)

Table 8-12: User-Based Evaluation Criteria of the AskERIC Q&A Service (N=58) (continued)

Category	Measure	Definition	Frequency***
	4.5 UNDERSTAND REQUEST**	Whether the intermediary understood the client's request or information need as perceived by the client. Relevant to Taylor's (1986) "flexibility."	P: 1 (1.7 %) N: 1 (1.7 %) T: 2 (3.5 %)
5. TIME SAVINGS	5.1 RESPONSE-SPEED*	Quickness or promptness of response time, or efficiency. Equivalent to Taylor's (1986) "response-speed." If referred to the time savings of an entire IPS process rather than response time, use TIME SAVINGS IN IPS.	P: 34 (58.6 %) N: 0 T: 34 (58.6 %)
	5.2 TIME-SAVINGS IN IPS**	Whether the response or information saved the client's time in the subsequent IPS process. Relevant but broader than Taylor's (1986) "response speed."	P: 5 (8.6 %) N: 3 (5.2 %) T: 8 (13.8 %)
6. COST SAVINGS	6.1 COST-SAVING IN IPS**	Whether the response or information saved client's money for the subsequent IPS process. Relevant but broader than Taylor's (1986) "cost-saving."	P: 1 (1.7 %) N: 3 (5.2 %) T: 4 (6.9 %)
7. QUANTITY OF INFORMATION	7.1 AS MUCH AS WANTED	Amount or quantity of information is plenty. No relevant concept was found in Taylor (1986).	P: 16 (27.6 %) N: 0 T: 16 (27.6 %)
	7.2 TOO MUCH	Amount or quantity of information is too much. No relevant concept was found in Taylor (1986).	P: 0 N: 5 (8.6 %) T: 5 (8.6 %)
	7.3 TOO LITTLE	Amount or quantity of information is too little. No relevant concept was found in Taylor (1986).	P: 0 N: 2 (3.5 %) T: 2 (3.5 %)
8. DRS FEATURES	8.1 ACKNOWLEDG MENT	Acknowledgment provided by the service of the reception of the request message and expected response time. No relevant concept was found in Taylor (1986).	P: 10 (17.2 %) N: 0 T: 10 (17.2 %)
	8.2 HUMANNESS	Human (but not machine) spent time & efforts to find information and wrote the response. No relevant concept was found in Taylor (1986).	P: 7 (12.1 %) N: 0 T: 7 (12.1 %)
	8.3 RESPONSIVENESS	Whether the service responded to the client. No relevant concept was found in Taylor (1986).	P: 7 (12.1 %) N: 0 T: 7 (12.1 %)
	8.4 TONE OF MESSAGE	Quality or tone of message accompanied to the response or information. No relevant concept was found in Taylor (1986).	P: 5 (8.6 %) N: 0 T: (5 (8.6 %)
9. USER SITUATIONS	9.1 WORDING OF REQUEST	MESSAGE Adequacy of wording of the request message written by the client. No relevant concept was found in Taylor (1986).	P: 0 N: 9 (15.5 %) T: 9 (15.5 %)
	9.2 FRUSTRATION LEVEL	Whether the response or information add or reduce frustration of the client. No relevant concept was found in Taylor (1986).	P: 5 (8.6 %) N: 1: (1.7 %) T: 6 (10.3 %)
	9.3 NOVELTY	Whether the information was new to the client. No relevant concept was found in Taylor (1986).	P: 2 (3.5 %) N: 1 (1.7 %) T: 3 (5.2 %)
	9.4 COMPREHEND RESPONSE	Whether the client understood the response or information provided by the intermediary. No relevant concept was found in Taylor (1986).	P: 0 N: 3 (5.2 %) T: 3 (5.2 %)
	9.5 WILLINGNESS TO READ	Whether the client was willing to read documents referred to by the intermediary. No relevant concept was found in Taylor (1986).	P: 0 N: 2 (3.5 %) T: 2 (3.5 %)

Note: Evaluation measure: * are equivalent to Taylor's values; ** Relevant to Taylor's values;
***Frequency: number of participants who used the measure (P: in a positive sense; N: in a negative sense; and T: total number of P + N); Percentage in this column represents the percentage of participants used a measure divided by all 58 participants who reported evaluation measures.

1.2 **MAKE IPS EASIER**: Was developed to capture these data instances in which participants articulated their perception that responses or information they received from AskERIC reduced difficulty in their subsequent IPS processes. This concept is broader than Taylor's original definition of "ease of use" which concerned only the reduction of difficulty in physical use of the service. This study included the measure under the criterion of easiness, because this concept is something to do with the ease or reduction of difficulty. This measure is mostly used in a positive sense except for one, implying that participants who cared about the impact of the service outcome on their subsequent IPS processes generally evaluated it positively.

1.3 **PHYSICAL ACCESSIBILITY**: Is based on Taylor's (1986) value "physical accessibility" which he defined as "the process of making access to information stores easier in a physical sense" (p. 70), but this study applied the concept based on the users' perception of physical accessibility. The two participants who used this measure used it in a positive sense, implying that they perceived the service to be easily accessible.

1.4 **FORMATTING**: Is based on Taylor's "formatting" which he defined as "the physical presentation and arrangement of data/information in ways that allow more efficient scanning and hence extraction of items of interest from the store." Only one data instance was assigned this measure, in a positive sense.

2 Noise Reduction

Taylor (1986) defined this criterion to include the three processes of (1) "excluding or withdrawing information"; (2) "including or supplying information within some boundaries"; and (3) "focusing on specific data or facts" (p. 57-58). This study identified five evaluation measures under this category. They are: 2.1 LINKAGE, 2.2 ONLINE LINKAGE TO FULLTEXT, 2.3 SELECTIVITY, 2.4 TYPE OF INFORMATION and 2.5 SEARCH SKILLS OF INTERMEDIARY.

2.1 **LINKAGE**: Equivalent to Taylor's (1986) "linkage" which he defined as "the value added by providing pointers and links to items, sources, and systems external to the system in use, thus expanding the client's information options" (p. 70). This measure was assigned to these data instances in which participants articulated that responses or information provided by AskERIC led or did not lead to sources or a next step of their IPS processes as a reason for reporting a particular evaluation score. This measure was used by 42.5 % of the participants, mostly in a positive sense, implying that most of the participants who wanted to obtain references or links to sources that may include relevant information evaluated the responses or information they received from the service positively.

2.2 ONLINE LINKAGE TO FULLTEXT: A particular kind of "linkage." This measure was assigned to those data instances in which participants articulated their disappointments for the absence of direct links to fulltext digital documents from citations given by AskERIC or in the ERIC database. About 16% of participants used this measure, all in a negative sense, implying that some Internet users are accustomed to getting full text online and feel reluctant to take additional steps to obtain fulltext of the printed version of these documents (P36).

2.3 SELECTIVITY: Based on Taylor's (1986) "selectivity" which he defined as "the value added when choices are made at the input point of the system, choices based on the appropriateness and merit of information chunks to the client population served" (p. 70). This study modified Taylor's definition to include selectivity possibly added by human intermediaries at the output point, based on the appropriateness and merit of information chunks to a particular client's information need. Almost 20% of the participants used this measure in a negative sense, implying that they were critical about the selectivity of the information provided by AskERIC. Data instances also suggest that the concept of selectivity may have been used to mean at least four different aspects including (1) subject matter, (2) instruction, (3) grade level, and (4) type of information. The last aspect was developed as a separate measure.

2.4 TYPE OF INFORMATION: A particular kind of "selectivity" based on the type of information (e.g., web sites, documents, journal articles, empirical study, abstracts, references to other sources, aggregated data, statistical data, downloadable pictures, etc.). This measure was assigned to those data instances in which the participants evaluated responses or information they received from AskERIC based on whether it matched what they requested/expected in terms of the type of information. The fact that more than 60 % of participants used this measure, either positively or negatively, implies that this measure is rather important in evaluating the outcome of the AskERIC Q&A Service.

2.5 SEARCH SKILLS OF INTERMEDIARY: Relevant to Taylor's (1986) "precision" which he defined as "the capacity of a system to aid users in finding exactly what they want, by providing signals on such attributes as language, data aggregation, sophistication level, or ranking output" (p.70). In this study, however, the measure of "search skills of intermediary" was applied only to those data instances that focused on intermediaries' skills in terms of knowledge of the ERIC system, search skills, and vocabulary skills. Even though only four participants used this measure, all of them used it in a positive sense, implying that they appreciated AskERIC intermediaries' sophisticated search skill.

3 Quality of Information

Taylor (1986) defined this category as "a user criterion which has to do with excellence or in some cases truthfulness in labeling" and includes both (a) the reliability of the data/ information or service, and (b) the assumptions made in the original selection or generation of data (p. 62). This study identified four evaluation measures of 3.1 COMPREHENSIVENESS, 3.2 CORRECTNESS, 3.3 DEPTH, and 3.4 CURRENCY under this category.

3.1 COMPREHENSIVENESS: Based on Taylor's (1986) "comprehensiveness" which he defined as "the value added by completeness of coverage of a particular subject or a particular form of information." Since all 11 participants identified as using this measure used it in a positive sense, participants who cared about comprehensiveness seemed to have appreciated the comprehensiveness of information provided by AskERIC.

3.2 CORRECTNESS: Somewhat related to Taylor's (1986) "validity" which he defined as "the value added when the system provides signals about the degree to which data or information presented to users can be judged as sound" (p. 70). However, this study assigned this measure to those data instances that indicated the truth or falsity of the data or information, as determined by the user. In a sense, this measure may reflect a unique setting of this study that collected data from clients of a digital reference service in which users received responses or information some time after they sent requests, and interviews were performed some time after participants received response or information from intermediaries. During the time lag between sending requests and receiving responses as well as between receiving responses and participating in the interview, participants may have had opportunities to obtain correct answers to their questions from other sources.

3.3 DEPTH: May be considered as a part of "comprehensiveness." However, this study made a distinction between *depth*, which has more to do with the elaborateness of the information or the answer, and *comprehensiveness* that implies completeness of coverage. A participant who used this measure in a negative sense (P60) had very extensive self-searching using a variety of sources (people, library, Internet, listserv, etc.) in order to find very specific data of "drop-out rate of gifted learning disabilities" without success.

3.4 CURRENCY: Based on Taylor's (1986) "currency" which he defined as "the value added by (a) the recency of the data acquired by the system; and (b) by the capability of the system to reflect current modes of thinking in its structure, organization, and access vocabularies' (p. 70). Only one participant used this measure in a negative sense.

4 Adaptability

Taylor (1986) argued that attributes related to users' problem situations (besides subject matter) may determine whether a message will be accepted or rejected by users, and proposed the criterion of "adaptability" to capture those attributes that measure the match between the information provided and the problem context. He defined this criterion as "values [that] respond to the concern with *how* something is needed, and *why*, and how well the system, including the human actors, can respond to the environment in which the user operates" (p.65, italics in original). He further claimed that many of the values under this category "are added by human intermediaries because they are the only agents who can understand the problem setting and can interpret its dimensions and needs in nonsubject terms" at least for the present time (p. 65). This study identified five measures under this category: 4.1 ANSWER TO THE QUESTION, 4.2 USEFULNESS, 4.3 INTERACTIVITY, 4.4 CLARITY OF INFORMATION, and 4.5 UNDERSTAND REQUEST. Among them, the first three measures are relevant to Taylor's "closeness to the problem" which he defined as "the value added by the activities of systems, usually through human intervention, to meet the specific needs of a person in a particular environment with a particular problem; this implies knowledge of that person's style, bias, idiosyncrasies, and sophistication, as well as the politics and constraints of the context" (P. 70).

4.1 ANSWER TO THE QUESTION: Developed to capture data instances in which participants expressed expectation of receiving answers to their questions rather than references to documents or sources that might include answers. This measure reflects the current practice of AskERIC intermediaries who usually provide references to ERIC documents, websites and/or listservs that match the subject matter of questions, rather than directly answering questions, except for those requests or questions that asked specific ERIC or AskERIC procedures (*System-wide Guide to AskERIC Question Answering, 1999*). One quarter of the participants used this measure in a negative sense, while only one used it in a positive sense. These numbers imply that a relatively large portion of participants expected AskERIC intermediaries to understand their problem situations and provide answers in the way that would directly address their problem contexts, as suggested by Taylor (1986).

4.2 USEFULNESS: Developed to capture those data instances that include participants' articulation of usefulness, helpfulness or actual uses of response or information they received. In other words, this measure was assigned to data instances that implied the fitness of responses or information to participants' problem situations. A great majority of participants who articulated this measure (just under 20 %) used it in a positive sense, implying that AskERIC responses were useful for them.

4.3 **INTERACTIVITY**: Developed to capture data instances in which participants described their interactions by telephone or e-mail with AskERIC intermediaries, and/or their claims on the absence of such interaction. All data instances that described the presence of direct interactions, generated either by participants or intermediaries, used this measure in a positive sense. On the contrary, participants who received responses or information that did not match their needs expressed their disappointment with the absence of direct interaction expected to be initiated by the intermediary. They used this measure in a negative sense. This finding suggests the importance of interactions in the question negotiation process to provide information that matches users' problem situations.

4.4 **CLARITY OF INFORMATION**: Based on Taylor's (1986) "simplicity" which he defined as "the value achieved by presenting the most clear and lucid (explanation, data, hypothesis, or method) among several within quality and validity limits; not to be confused with simplistic" (p. 70). In this study, this measure was applied to the evaluation of substantive content of information. The term "clarity of information" is used in order to distinguish it from the "clarity of the response messages" which is considered as a part of "tone of message" in this study and categorized under "digital reference service (DRS) features." Only two participants used this measure, one in a positive sense and the other in a negative sense.

4.5 **UNDERSTAND REQUEST**: Developed to capture data instances in which participants articulated their perception of whether the intermediary understood the request in the context of the participants' specific needs in a particular environment with a particular problem. This is relevant to Taylor's "flexibility" which he defined as "the capability of a system to provide a variety of ways and approaches of working dynamically with the data/information in a file" (p. 70). Two data instances were assigned this measure, one in a positive sense, and the other in a negative sense.

5 Time Savings

Taylor (1986) defined this criterion as "the response time of that system [including] how fast can a reference be retrieved? How fast can a document be delivered? How long need a customer wait at the terminal for a response? How long does it take to generate a special report ?" (p. 69). Two measures, 5.1 RESPONSE-SPEED and 5.2 TIME-SAVINGS IN IPS were identified under this category. By including the measure of 5.2 TIME-SAVINGS IN IPS, the definition of this criterion was expanded from Taylor's original criterion of the "response speed" of the service to include the time savings in subsequent IPS processes.

5.1 **RESPONSE-SPEED**: Based on Taylor's (1986) "response-speed" which he defined as "the perceived value of a system on the speed of its response time" (p. 70). This study applied the measure to those data instances that articulated quickness or promptness of response time, as well as the efficiency of the service. A majority of the participants (59 %) used this measure all in a positive sense, implying that "response-speed" of the service was perceived to be reasonably quick.

5.2 **TIME-SAVINGS IN IPS**: Developed to capture these data instances in which participants articulated that responses or information they received from AskERIC saved or did not save their time in their subsequent IPS processes. This measure is broader than Taylor's (1986) original criterion of "time savings" but categorized here because it is related to savings of time.

6 Cost Savings

Taylor's original definition of this criterion was "the value achieved by conscious system design and operating decisions that save dollars for the client" (p. 70). The study did not identify any evaluation measures that correspond to Taylor's "cost-savings," probably because the AskERIC Q&A Service is free of charge and, therefore, "cost-saving [was] less clear" for users (Taylor, 1986, p. 69). Instead, the study developed the measure of 6.1 COST-SAVINGS IN IPS, which is to do with spending or saving of money in participants' subsequent IPS processes. The study put the measure under this category even though it is much broader than Taylor's original definition of "cost-savings," only because it has to do with money.

6.1 **COST-SAVINGS IN IPS**: Developed to capture those data instances that indicated perceived cost-saving or cost-spending in participants' subsequent IPS processes. Only one participant, a manager of a company, used this measure in a positive sense. Three other participants who needed to spend money from own pockets used it in a negative sense, because the subsequent process of retrieving documents referred to by the AskERIC incurred some cost, even though the AskERIC Q&A Service itself was free of charge.

7 Quantity of Information

This criterion is not included in Taylor's Value-added criteria, but is widely used in evaluating traditional information services such as libraries' collection size. Hernon & McClure's (1990) measure of "extensiveness" which they defined as "the amount of a service provided in relation to the population served... generally a measure of quantity rather than quality" (p. 5) seems to be relevant to this measure. Three measures were identified under this category. They are: 7.1 AS MUCH AS WANTED, 7.2 TOO MUCH, and 7.3 TOO LITTLE.

7.1 **AS MUCH AS WANTED**: Applied to data instances in which participants, in evaluating responses or information positively, referred to the extent of responses. About one-third of the participants used this measure to indicate that they appreciated the rather large volume of information provided by AskERIC.

7.2 **TOO MUCH**: Applied to data instances in which participants referred to the size of responses or amount of information as too much. About 9 % of the participants used this measure, implying they were overwhelmed with the large amount of information provided by the service.

7.3 **TOO LITTLE**: Applied to data instances in which participants referred to the size of responses or amount of information as too little. Only two participants used this measure, implying they wanted more information than what they received.

8 Digital Reference Service (DRS) Feature

This category was uniquely developed in this study. Four evaluation measures were identified under this category. They are: 8.1 ACKNOWLEDGMENT, 8.2 HUMANNESS, 8.3 RESPONSIVENESS, and 8.4 TONE OF MESSAGE. None of these are relevant to Taylor's (1986) criteria probably because these measures reflect unique features of the AskERIC Q&A Service. Some of these measures are equivalent to a framework of evaluation criteria developed for digital reference services (White, 1999). For example, (8.1) *acknowledgment* corresponds to "acknowledgment" and (8.4) tone of message is relevant to "response guidelines" in the guidelines, implying that measures under this criterion may also be applicable to other digital reference services.

8.1 **ACKNOWLEDGMENT**: Captured those data instances in which participants articulated their appreciation of receiving acknowledgment or confirmation of the reception of request s and provision of approximate time frame to get answers or information. All participants who used this measure (10 or 17.2%) did so in a positive sense.

8.2 **HUMANNESS**: Captured those data instances in which participants articulated their appreciation of the fact that human (i.e., intermediaries), not a machine, spent time and effort in responding to the request, as well as their appreciation of the provision of the intermediary's name in the response message. These data instances imply that at least some participants anticipated receiving machine-generated responses.

8.3 **RESPONSIVENESS**: Captured those data instances in which participants articulated their appreciation of the fact that the service responded to their requests, implying that some participants were accustomed to "the unanswered e-mail" phenomenon of the "Blackhole in Cyberspace" (Suler, 1997).

8.4 TONE OF MESSAGE: Captured those data instances in which participants articulated the quality or tone of the message (not the information) they received. This measure is similar to Hahn's (1997) "empathy" which she used to characterize e-mail virtues in her analysis of the success and failure of an e-mail-based help-desk of a medical library.

9 User Situations

This category was uniquely developed in this study. The study identified five evaluation measures under this category. They are: 9.1 WORDING OF REQUEST MESSAGE, 9.2 FRUSTRATION LEVEL, 9.3 NOVELTY, 9.4 COMPREHEND RESPONSE, and 9.5 WILLINGNESS TO READ. These measures are mostly dependent on the participants' internal and external situations rather than on the output of the service, and therefore may reflect the unique approach taken by this study in trying to capture users' perspectives in a natural context. Taylor's (1986) criteria are limited in this respect because they were developed based on information professionals' viewpoints rather than users'.

9.1 WORDING OF REQUEST MESSAGE: Captured those data instances in which participants referred to problems in their own request messages as a reason for giving a particular evaluation score on responses or information they received from AskERIC. All participants who used this measure (about 15 %) did so in a negative sense, implying that they were critical of their own request messages. As these data instances indicate, participants who received responses or information that did not match their expectation tended to attribute the failure to the "wording of request messages" written by themselves, rather than to the service or the intermediary. Recurrent articulation of this theme among participants implies the persistency of feedback mechanisms within IPS processes – people tend to go back to the previous step of the process when they did not succeed in the present step (Hert, 1997). At the same time, some of these articulations indicate a subtle change or increase of focus of information needs. For instance, some participants realized what they wanted only after they examined the responses or information obtained from AskERIC that did not match their expectations. In that sense, receiving responses or information that did not meet their need may still have helped participants in clarifying their information needs. This phenomenon is similar to the concept of "partial relevance" proposed by Spink and Greisdorf (1997).

9.2 FRUSTRATION LEVEL: This measure captured data instances in which participants reported whether the response or information increased or reduced their frustration. Five participants used this measure in a positive sense, while one used it in a negative sense, implying that responses or information provided by AskERIC tended to reduce frustration level when they matched participants' expectations. It should be noted that all participants who used this measure performed self-searching before sending their request to the service.

9.3 **NOVELTY**: Captured those data instances in which participants reported whether there was new information or not in what they received from AskERIC in evaluating it. Only two participants used this measure, one in a positive sense and the other in a negative sense. Both of them had performed extensive self-searching before they made requests of AskERIC.

9.4 **COMPREHEND RESPONSE**: Captured those data instances in which participants reported that they did not understand the response or information they received. This measure may be relevant to Taylor's (1986) "simplicity" which he defined as "the value achieved by presenting the most clear and lucid (explanation, data, hypothesis, or method) among several within quality and validity limits" (p. 70), if the difficulties were associated with the way intermediaries presented the information. But the study categorized it under user characteristics, because whether a participant could understand the response message might also depend upon his/her knowledge structure. Three participants were identified as using this measure in a negative sense. All of them identified themselves as having a low level of perceived IPS skill.

9.5 **WILLINGNESS TO READ**: Captured those data instances in which participants reported that they wanted to obtain information or answers to their questions without being bothered to read documents that were referred by AskERIC. Two participants (an administrator and a K-12 teacher) used this measure to evaluate the AskERIC responses, both in a negative sense, implying that at least some of them did not want to read massive documents, as suggested by Richardson (1981) for engineers, Arnold (1982) for managers, and Nicholas (1995) for politicians.

It seems, therefore, that Taylor's (1986) *Value-added Criteria*, originally based on service providers' practices of information systems and services, was also useful in capturing and categorizing those evaluation measures reported by users of the AskERIC Q&A Service, a digital reference service, in a natural setting. This study identified evaluation measures categorized under all six categories of values in the value-added framework, with some modifications however. Evaluation measures identified in this study under Taylor's (1986) original six categories may be useful in capturing common aspects of information services from users' perspective.

Taylor's (1986) framework was also useful in separating out those evaluation measures external to its original categories. The study identified three categories of evaluation criteria external to Taylor's original framework. The fact that about one third of all participants used *quantity* (7 QUANTITY OF INFORMATION) as a measure to evaluate the service outcome implies that amount of information provided may be an important aspect in evaluating information services from the users' point of view. The category of *DRS features* (8 DRI FEATURES), newly developed by this study to capture unique characteristics of the AskERIC Q&A Service, may be helpful

in identifying service elements perceived to be important for users. The fact that two of the four measures under this category are related to measures in the framework of evaluating other DRS services (White, 1999) implies these measures to be applicable in assessing other digital reference services and, therefore, it may be useful in comparing service providers' perspective and users' perspective of *DRS features*. The category of *user situations* (9 USER SITUATIONS) was newly developed in this study to capture evaluation measures associated with unique user situations. The finding informs aspects of user situations that may affect their evaluation of information services.

ASSESSMENT OF ASKERIC Q&A SERVICE BY EVALUATION CRITERIA

Table 8-13 presents the distribution of evaluation criteria used by 58 participants who reported the evaluation score and articulated reasons for the particular score. Participants who used one or more evaluation measures under each evaluation criterion are pooled together to generate the distribution of participants into each of nine evaluation criteria. Central tendencies of the distribution of evaluation score for both positive and negative uses of each criterion are also presented in Table 8-13.

Table 8-13: Positive and Negative Uses of Evaluation Criteria (N=58)

	Positive				Negative			
Evaluation Criteria	Frequency	Mean	SD	Median	Frequency	Mean	SD	Median
1. EASINESS	12 (20.7%)	9.2	2.54	10.0	1 (1.7 %)	2.0	-	2.0
2. NOISE REDUCTION	34 (58.6 %)	9.2	1.34	10.0	**26 (44.8 %)**	**7.58**	**2.28**	**8.0**
3. QUALITY OF INFORMATION	11 (19.0 %)	9.5	0.69	10.0	3 (5.2 %)	6.8	5.06	9.5
4. ADAPTABILITY	13 (22.4 %)	9.7	0.86	10.0	**21 (36.2 %)**	**7.0**	**3.12**	**8.0**
5. TIME SAVINGS	35 (60.3 %)	8.2	2.16	10.0	3 (5.2 %)	8.0	1.00	8.0
6. COST SAVINGS	1 (1.7 %)	9.0	-	9.0	3 (5.2 %)	9.0	1.73	10.0
7. QUANTITY	16 (27.6 %)	9.0	1.22	10.0	7 (12.1 %)	8.0	1.63	8.0
8. DRS FEATURE	21 (36.2 %)	8.6	2.29	10.0	-	-	-	-
9. USER SITUATION	3 (5.2 %)	10.0	0.0	10.0	**14 (24.1 %)**	**7.1**	**2.53**	**7.75**

Table 8-13 informs the way participants evaluated the AskERIC Q&A Service and its outcome in relation to their IPS processes. Following patterns of uses of evaluation measures in each of nine evaluation criteria may be identified:

1 **EASINESS**: A relatively small percentage of participants used this criterion, mostly in a positive sense, and their evaluation scores were very high (10 in 1-10 scale). This implies that participants who cared about easiness evaluated the AskERIC Q&A Service rather positively.

2 **NOISE REDUCTION**: More than half of all participants used one or more measures in this criterion in a positive sense, and their evaluation scores were very high (10 in 1-10 scale),

implying that a majority of them appreciated the noise reduction provided by the service. However, almost half of the participants used it in a negative sense, and their evaluation scores were relatively low (median = 8 in 1-10 scale), implying they were critical about the service outcome in terms of noise reduction. This contrast may inform that participants in different situations may evaluate this aspect of the service outcome in different manners.

3 **QUALITY OF INFORMATION**: A relatively small percentage of participants used this criterion, mostly in a positive sense, and their evaluation scores were very high (median = 10 in 1-10 scale), implying that participants who cared about quality of information evaluated the AskERIC Q&A Service rather positively.

4 **ADAPTABILITY**: A relatively small percentage of participants used this criterion in a positive sense, but their evaluation scores were very high (median = 10 in 1-10 scale), implying that they appreciate the adaptability of the information provided by the service. On the other hand, more than one third of all participants used this criterion in a negative sense, and their evaluation scores were relatively low (median = 8 in 1-10 scale), implying that they were rather critical about the adaptability of the information provided. This finding may imply that participants in different situations may evaluate this aspect of the service outcome in different manners.

5 **TIME SAVINGS**: A majority of participants used this criterion in a positive sense, implying that most of the participants appreciated the time savings provided by the use of the AskERIC Q&A Service.

6 **COST SAVINGS**: Very few participants used this criterion, implying that most of participants are not aware of cost savings probably because the service itself is free of charge.

7 **QUANTITY**: More than a quarter of participants used this criterion in a positive sense, and their evaluation scores were very high (median = 10 in 1-10 scale), implying that participants who cared about quantity of information tended to evaluate the AskERIC Q&A Service positively. However, there were still some participants who were critical about the quantity of information provided by the service, and their evaluation scores were relatively low (median = 8 in 1-10 scale). This finding implies that participants in different situations may evaluate this aspect of the service outcome in different manners.

8 **DRS FEATURES**: More than one third of participants used this evaluation criterion in a positive sense, and their evaluation scores were very high (median = 10 in 1-10 scale), and

no one used it in a negative sense. This finding implies that participants who cared about these unique features of the DRSs appreciated the current practices of the service.

9 **USER SITUATIONS**: Very few participants used this criterion in a positive sense. On the other hand, almost a quarter of them used this criterion in a negative sense and their evaluation scores were rather low (7.75 in 1-10 scale) implying that participants' unique situational factors identified in this study may affect the evaluation of the AskERIC Q&A Service rather negatively. This finding also informs that users' situational factors not manipulatable by the service itself may generate a rather negative evaluation of the AskERIC Q&A Service.

Based on the above, the AskERIC Q&A Service and its outcome was generally appreciated for 1 EASINESS, 5 TIME SAVINGS, 7 QUANTITY, and 8 DRS FEATURES. However, some participants evaluated the service rather negatively for its 2 NOISE REDUCTION and 4 ADAPTABILITY. Still some participants evaluated the service outcome rather negatively due to 9 USER SITUATION.

Above analysis also suggests the significance of user situations in evaluation of the AskERIC Q&A Service. The distribution was examined for four situational variables of participants in order to identify patterns of how user situations are associated with uses of evaluation criteria.

ASSOCIATION BETWEEN EVALUATION CRITERIA AND USER SITUATIONS

The relation between *evaluation criteria* and participants' situations was analyzed in order to identify associations between them. The distribution of evaluation criteria was compared with four situational variables including (1) whether participants' did self-searching before making requests of AskERIC; (2) whether participants had experience in using the AskERIC Q&A Service; (3) perceived level of IPS skill; and (4) participants' IPS goal category.

Association between Evaluation Criteria and Self-Searching before AskERIC

Table 8-14 presents associations between *evaluation criteria* and whether participants performed *self-searching before making requests of the AskERIC Q&A Service*. Fifty-eight participants who provided evaluation scores and who articulated the associated evaluation measures were divided into two groups: (a1) those who did self-searching before sending requests (n=44); and (a2) those who did not (n=14). The distribution of evaluation criteria for each group is presented in Table 8-14.

The following pattern of associations between evaluation criteria and whether participants performed self-searching before making the requests of AskERIC was identified in Table 8-14.

Table 8-14: Association of Evaluation Criteria and Self-Searching Before AskERIC (N=58)

Evaluation Criteria	Positive vs. Negative*	Self-searching before AskERIC		
		a1: Yes (n=44)**	a2: No (n=14)**	Total (N=58)**
1. EASINESS	Positive	7 (15.9 %)	5 (35.7 %)	12 (20.7 %)
	Negative	1 (2.3 %)	0	1 (1.7 %)
2. NOISE REDUCTION	Positive	**23 (52.3 %)**	**11 (78.6 %)**	34 (58.6 %)
	Negative	20 (45.5 %)	6 (42.9 %)	26 (44.8 %)
3. QUALITY OF INFORMATION	Positive	11 (25.0 %)	0	11 (19.0 %)
	Negative	2 (4.6 %)	1 (7.1 %)	3 (5.2 %)
4. ADAPTABILITY	Positive	**12 (27.3 %)**	**1 (7.1 %)**	13 (22.4 %)
	Negative	16 (36.4 %)	5 (35.7 %)	21 (36.2 %)
5. TIME SAVINGS	Positive	**31 (70.5 %)**	**4 (28.6 %)**	35 (60.3 %)
	Negative	2 (4.6 %)	1 (7.1 %)	3 (5.2 %)
6. COST SAVINGS	Positive	1 (2.3 %)	0	1 (1.7 %)
	Negative	3 (6.8 %)	0	3 (5.2 %)
7. QUANTITY	Positive	13 (29.6 %)	3 (21.4 %)	16 (27.6 %)
	Negative	5 (11.4 %)	2 (14.3 %)	7 (12.1 %)
8. DRS FEATURE	Positive	17 (38.6 %)	4 (28.6 %)	21 (36.2 %)
	Negative	0	0	0
9. USER SITUATION	Positive	7 (15.9 %)	0	7 (12.1 %)
	Negative	11 (25.0 %)	3 (21.4 %)	14 (24.1 %)
Average # of criteria/participant	Positive	122/44 = 2.8	28/14 = 2.0	150/58 = 2.6
	Negative	60/44 = 1.4	18/14 = 1.3	78/58 = 1.3

*Whether the criterion was used in a positive sense (Positive) or negative sense (Negative).
Percentage of this column was calculated by dividing number of participants who used the measure positively or negatively by number of participants in each experience group. Numbers in **bold represent evacuation criteria with more than 20 % difference between two groups.

- A larger percentage of participants who did self-searching before making the requests of AskERIC (a1) used the evaluation criterion 5 TIME SAVINGS in a positive sense compared to the other group. This is probably because they realized that self-searching took a considerably longer time.

- A larger percentage of participants who did self-searching before making requests of AskERIC (a1) used the evaluation criterion 4 ADAPTABILITY in a positive sense compared to the other group. This is probably because they found information provided by AskERIC to be more useful than what they found in self-searching[4].

- A larger percentage of participants who did not perform self-searching before making the requests of AskERIC (a2) used the evaluation criterion 2 NOISE REDUCTION positively compared to the other group. This is probably because they used the AskERIC Q&A Service in the initial stage of

[4] The examination of the distribution of evaluation measures of this group informed that the major source of this difference is useful/helpful – a larger percentage (18.2%) of participants who did self-searching before AskERIC (A1) used the measure in a positive sense compared to the other group (7.1 %).

their IPS process to explore relevant sources and therefore, they appreciated the service outcome as providing linkage to possible sources of information.

Based on the above, it seems that participants who did self-searching before sending requests tended to evaluate the outcome of the AskERIC Q&A Service as more adaptable and time-saving in relation to their self-searching processes/outcomes, while participants who did not perform self-searching before sending requests tended to appreciate the capability of noise reduction of the AskERIC Q&A Service.

Association between Evaluation Criteria and Experience in Using the AskERIC Q&A Service

Table 8-15 presents associations between *evaluation criteria* and whether participants had *experience in using the AskERIC Q&A Service*. Fifty-eight participants who provided evaluation scores and who articulated the associated evaluation measures were divided into two groups: (b1) those who had experience in using the service (n=17); and (b2) those who did not (n=41). The distribution of evaluation criteria for each group is presented in Table 8-15.

Table 8-15: Association Between Evaluation Criteria and Experience in Using the AskERIC Q&A Service (N=58)

Evaluation Criteria	Positive vs. Negative*	Experience of Using the AskERIC Q&A Service		
		b1: Yes (n=17)**	b2: No (n=41)**	Total (N=58)**
1. EASINESS	Positive	2 (11.8 %)	10 (24.4 %)	12 (20.7 %)
	Negative	0	1 (2.4 %)	1 (1.7 %)
2. NOISE REDUCTION	Positive	8 (47.1 %)	26 (63.4 %)	34 (58.6 %)
	Negative	10 (58.8 %)	16 (39.0 %)	26 (44.8 %)
3. QUALITY OF INFORMATION	Positive	1 (5.9 %)	10 (24.4 %)	11 (19.0 %)
	Negative	2 (11.8 %)	1 (2.4 %)	3 (5.2 %)
4. ADAPTABILITY	Positive	2 (11.8 %)	11 (26.8 %)	13 (22.4 %)
	Negative	7 (41.2 %)	14 (34.2 %)	21 (36.2 %)
5. TIME SAVINGS	Positive	9 (52.9 %)	26 (63.4 %)	35 (60.3 %)
	Negative	1 (5.9 %)	2 (7.3 %)	3 (5.2 %)
6. COST SAVINGS	Positive	0	1 (2.4 %)	1 (1.7 %)
	Negative	0	3 (7.3 %)	3 (5.2 %)
7. QUANTITY	Positive	**2 (11.8 %)**	**14 (34.2 %)**	16 (27.6 %)
	Negative	2 (11.8 %)	5 (12.2 %)	7 (12.1 %)
8. DRS FEATURE	Positive	4 (23.5 %)	17 (41.5 %)	21 (36.2 %)
	Negative	0	0	0
9. USER SITUATION	Positive	1 (11.8 %)	6 (14.6 %)	7 (12.1 %)
	Negative	**8 (47.1 %)**	**6 (14.6 %)**	14 (24.1 %)
Average # of criteria/participant	Positive	**29/17 = 1.7**	**121/41 = 3.0**	150/58 = 2.6
	Negative	30/17 = 1.8	48/41 = 1.2	78/58 = 1.3

*Whether the criterion was used in a positive sense (Positive) or negative sense (Negative).
Percentage of this column was calculated by dividing number of participants who used the measure positively or negatively by number of participants in each experience group. Numbers in **bold represent evaluation criteria with more than 20 % difference between two groups.

The following associations between *evaluation criteria* and participants' *experience in using the AskERIC Q&A Service* were identified:

- The average number of criteria used in a positive sense shown in the last row of the table indicates that participants who had no experience in using the service (b2) tended to use evaluation criteria rather positively compared to those who had experience. This might be because participants who had a good experience with using the service returned to the service. Thus they might have had a higher level of expectation of the outcome of the service due to the previous good experience, compared to first time users of the service, and therefore they might have evaluated it less positively[5].

- A larger percentage of participants who had no experience in using the service (b2) evaluated 7 QUANTITY of the service outcome in a positive sense compared to the other group. This might be because they appreciated a huge amount of references and links provided by the service, while participants who had experience in using the service did not appreciate it the second time because they anticipated to it.

- A larger percentage of participants who had experience in using the service (b1) used the evaluation criterion of 9 USER SITUATION in a negative sense. This might be because participants who received excellent results from the service in the past assumed the service would have provided excellent information again, and, therefore, criticized their own request messages rather than responses or information they received for the second time from the service.

The above analysis suggests that participants who had no experience in using the AskERIC Q&A Service tended to evaluate the outcome of the AskERIC Q&A Service to be more positive, probably because they appreciated the large amount of information provided. On the other hand, participants who had experience in using the service tended to evaluate it less positively in comparison to their past good experience.

Association between Evaluation Criteria and Perceived Level of IPS Skill

Table 8-16 presents the association between evaluation criteria and the perceived level of IPS skill. Fifty-eight participants who reported evaluation scores and who articulated the associated evaluation measures were divided into three groups: (c1) those who had a high level of perceived IPS skill (n=28); (c2) those who had a medium level of perceived IPS skill (n=15); and (c3) those who had a low level of perceived IPS skill. The distribution of evaluation criteria for each group is presented in Table 8-16.

[5] This phenomenon is somewhat relevant to the concept of 'regression toward the mean' in positivistic research, which is defined as "A possible bias due to remeasuring individuals who were originally selected because they all had either extremely low or extremely high scores. Their average score on the second measurement will be closer to the mean of all the scores, even though there are no changes in the individuals between the two measurement." (Katzer, et al. 1998, p. 281)

Table 8-16: Association Between Evaluation Criteria and Perceived Level of IPS Skill (N=58)

Evaluation Criteria	Positive vs. Negative*	Perceived Level of IPS Skill				
		c1: High (n=28)**	c2: Medium (n=15)**	c3: Low (n=8)**	Unknown (n=7)***	Total (N=58)**
1. EASINESS	Positive	5 (17.9 %)	4 (26.7 %)	1 (12.5 %)	2 (0.0 %)	12 (20.7 %)
	Negative	1 (3.6 %)	0	0	0	1 (1.7 %)
2. NOISE REDUCTION	Positive	15 (53.6 %)	9 (60.0 %)	5 (62.5 %)	5 (71.4 %)	34 (58.6 %)
	Negative	12 (42.9 %)	8 (53.3 %)	3 (37.5 %)	3 (42.9 %)	26 (44.8 %)
3. QUALITY OF INFORMATION	Positive	6 (21.4 %)	1 (6.7 %)	3 (37.5 %)	1 (14.3 %)	11 (19.0 %)
	Negative	3 (10.7 %)	0	0	0	3 (5.2 %)
4. ADAPTABILITY	Positive	**3 (10.7 %)**	6 (40.0 %)	**3 (37.5 %)**	1 (14.3 %)	13 (22.4 %)
	Negative	**10 (35.7 %)**	7 (46.7 %)	**1 (12.5 %)**	3 (42.9 %)	21 (36.2 %)
5. TIME SAVINGS	Positive	**16 (57.1 %)**	9 (60.0 %)	**7 (87.5 %)**	3 (42.9 %)	35 (60.3 %)
	Negative	2 (7.1 %)	1 (6.7 %)	0	0	3 (5.2 %)
6. COST SAVINGS	Positive	0	0	0	1 (14.3 %)	1 (1.7 %)
	Negative	2 (7.1 %)	0	0	1 (14.3 %)	3 (5.2 %)
7. QUANTITY	Positive	8 (28.6 %)	3 (20.0 %)	3 (37.5 %)	2 (28.6 %)	16 (27.6 %)
	Negative	3 (10.7 %)	2 (13.3 %)	0	2 (28.6 %)	7 (12.1 %)
8. DRS FEATURE	Positive	**7 (25.0 %)**	5 (33.3 %)	**4 (50.0 %)**	4 (57.1 %)	20 (34.5 %)
	Negative	1 (3.6 %)	1 (6.7 %)	0	0	2 (3.5 %)
9. USER SITUATION	Positive	2 (7.1 %)	2 (13.3 %)	2 (25.0 %)	1 (14.3 %)	7 (12.1 %)
	Negative	7 (25.0 %)	2 (13.3 %)	2 (25.0 %)	3 (42.9 %)	14 (24.1 %)
Average # of criteria	Positive	**63/28 = 2.3**	39/15 = 2.6	**28/8 = 3.5**	20/7 = 2.9	150/58 = 2.6
	Negative	**40/28 = 1.4**	20/15 = 1.3	**6/8 = 0.8**	12/6 = 2.0	78/58 = 1.3

*Whether the criterion was used in a positive sense (Positive) or negative sense (Negative).
Percentage of this column was calculated by dividing number of participants who used the measure positively or negatively by number of participants in each experience group. Numbers in **bold represents evaluation criteria with more than 20 % difference between two groups of c1: High and c3: Low.
***Data elicited in the interview were too limited to assign a perceived level of participants' IPS skill.

The following associations between *evaluation criteria* and *perceived level of IPS skill* were identified. In this analysis, the difference between two groups of those who had a high level of perceived IPS skill (c1) and those who had a low level of perceived IPS skill (c3) is compared.

- The average number of criteria used in a positive sense shown in the last row of Table 8-16 indicates that participants who had a low level of perceived IPS skill tended to use evaluation criteria in a positive sense compared to those who had a high level of perceived IPS skill.

- A larger percentage of participants who had a high level of perceived IPS skill (c1) evaluated 4 ADAPTABILITY of the service outcome in a negative sense, and a smaller percentage of this group evaluated it in a positive sense, compared to those who had a low level of IPS skill. This may be because participants who had a high level of IPS skill expected the service outcome to be able to answer their questions that are directly applicable to their problem situations, rather than providing topically relevant sources.

- A larger percentage of participants who had a low level of perceived IPS skill (C3) used the evaluation criterion 5 TIME SAVINGS in a positive sense compared to other groups. Perhaps they needed to spend a large amount of time to find the information due to their low level of IPS skill, and appreciate more of the quick response of the service.

The above analysis suggest that participants with a low level of IPS skill tended to appreciate a quick response as well as any help provided by the service compared to those with a high level of IPS skill. On the other hand, participants with a high level of perceived IPS skill tended to be more critical in evaluating service outcomes and expected the service to be capable of answering their questions and providing information that was responsive to their problem contexts.

Association between Evaluation Criteria and IPS Goal

Table 8-17 presents associations between *evaluation criteria* and the participants' *IPS goal*. The 58 participants who made evaluations were divided into three groups: (d1) those who had a degree-seeking goal (n=27); (d2) those who had a decision/action-planning goal; and (d3) those who had a teaching goal (n=7). The distribution of evaluation criteria for each group is presented in Table 8-17.

The following associations between *evaluation criteria* and *IPS goal* were identified.

- The average number of criteria used in a positive sense shown in the last row of the table indicates that participants who had a DEGREE SEEKING goal tended to use evaluation criteria in a positive sense compared to those with other IPS goals. On the other hand, the average number of criteria used in a negative sense indicates that participants who had a DECISION/ACTION PLANNING goal tended to use evaluation criteria in a negative sense compared to those who had a DEGREE SEEKING goal. Perhaps this is because the nature of outcomes of the AskERIC Q&A Service is more responsive to information needs of participants with the DEGREE SEEKING goal than to those with the other two goals.

- A large percentage of participants with a DEGREE SEEKING goal used the evaluation criterion 2 NOISE REDUCTION in a positive sense compared to those with a DECISION/ACTION PLANNING goal. An examination of the distribution of evaluation measures suggests that the major sources of this difference are 2.4 TYPE OF INFORMATION[6] and 2.1 LINKAGE[7]. Thus, participants with a

[6] A larger percentage (46.4 %) of participants with the degree-seeking goal (D1) used the evaluation measure TYPE OF INFORMATION in a positive sense compared to (D2) those with the decision/action-planning goal (27.8 %).

[7] A large percentage (46.4 %) of participants with the degree-seeking goal (D1) used the evaluation measure LINKAGE in a positive sense compared to (D2) those with the decision/action-planning goal (27.6 %).

Table 8-17: Association Between Evaluation Criteria and Participants' Goal Category (N=58)

Evaluation Criteria	Positive vs. Negative*	IPS Goal				
		d1: DEGREE SEEKING (n=27)**	d2: DECISION/ ACTION PLANNING (n=18)**	d3: TEACHING (n=7)**	Other (n=6)***	Total (N=58)
1. EASINESS	Positive	7 (25.9 %)	3 (16.7 %)	1 (14.3 %)	1 (16.7 %)	12 (20.7 %)
	Negative	0	0	1 (14.3 %)	0	1 (1.7 %)
2. NOISE REDUCTION	Positive	**18 (66.7 %)**	**8 (44.4 %)**	4 (57.1 %)	4 (66.7 %)	34 (58.6 %)
	Negative	10 (37.0 %)	9 (50.0 %)	3 (42.9 %)	4 (66.7 %)	26 (44.8 %)
3. QUALITY OF INFORMATION	Positive	5 (18.5 %)	3 (16.7 %)	0	3 (50.0 %)	11 (19.0 %)
	Negative	0	2 (11.1 %)	0	1 (16.7 %)	3 (5.2 %)
4. ADAPTABILITY	Positive	8 (29.6 %)	3 (16.7 %)	1 (14.3 %)	1 (16.7 %)	13 (22.4 %)
	Negative	**5 (18.5 %)**	**11 (61.1 %)**	2 (28.6 %)	3 (50.0 %)	21 (36.2 %)
5. TIME SAVINGS	Positive	**18 (66.7 %)**	**12 (66.7 %)**	**3 (42.9 %)**	2 (33.3 %)	35 (60.3 %)
	Negative	0	1 (5.6 %)	1 (14.3 %)	1 (16.7 %)	3 (5.2 %)
6. COST SAVINGS	Positive	0	0	0	1 (16.7 %)	1 (1.7 %)
	Negative	2 (7.4 %)	1 (5.6 %)	0	0	3 (5.2 %)
7. QUANTITY	Positive	8 (29.6 %)	5 (27.8 %)	0	3 (50.0 %)	16 (27.6 %)
	Negative	1 (3.7 %)	3 (16.7 %)	1 (14.3 %)	2 (33.3 %)	7 (12.1 %)
8. DRS FEATURE	Positive	11 (40.7 %)	7 (38.9 %)	2 (28.6 %)	1 (16.7 %)	21 (36.2 %)
	Negative	0	0	0	0	0
9. USER SITUATION	Positive	5 (18.5 %)	2 (11.1 %)	0	0	7 (12.1 %)
	Negative	6 (22.2 %)	6 (33.3 %)	1 (14.3 %)	1 (16.7 %)	14 (24.1 %)
Average # of criteria	Positive	**80/27 = 3.0**	43/18 = 2.4	**11/7 = 1.6**	16/6 = 2.7	150/58 = 2.6
	Negative	**24/27 = 0.9**	**33/18 = 1.8**	9/7 = 1.3	12/6 = 2.0	78/58 = 1.3

*Whether the criterion was used in a positive sense (Positive) or negative sense (Negative).
Percentage of this column was calculated by dividing number of participants who used the measure positively or negatively by number of participants in each experience group. Numbers in **Bold represent evaluation criteria with more than 20 % difference between two groups.
***Include marketing (n=3); career enhancement (n=1); presentation (n=1); and research (n=1).

DEGREE SEEKING goal tended to appreciate linkage to other sources, the type of information that matched their information needs.

- A larger percentage of participants with a DECISION/ACTION PLANNING goal used the evaluation criterion 4 ADAPTABILITY in a negative sense. An examination of the distribution of evaluation measures suggests that the major source of this difference is whether the responses or information obtained from AskERIC answered their questions[8].' This is perhaps because participants with a DECISION/ACTION PLANNING goal tended to seek information that could answer their questions in a way directly responding to their problem contexts.

[8] A large percentage (55.6 %) of participants with the decision/action-planning goal (D2) used the evaluation measure ANSWER TO THE QUESTION in a negative sense compared to (D1) those with the degree-seeking goal (10.7 %).

- A smaller percentage of participants with a TEACHING goal used the evaluation criterion 5 TIME SAVINGS in a positive sense. Perhaps this is because participants with a TEACHING goal tended to have a closer deadline than those with the other two goals due to their teaching schedule. The response time of two business days currently adopted by the AskERIC Q&A Service and perceived to be short by the other two groups might not be quick enough to be appreciated by those with the TEACHING goal.

The above analysis suggests that participants with a DEGREE SEEKING goal tended to evaluate outcomes of the AskERIC Q&A Service more positively compared to the other two groups probably because the type of information provided by the service – references and links to other relevant sources – met their information needs. On the other hand, participants with a DECISION/ACTION PLANNING goal tended to be more critical in evaluating the service in terms of noise reduction and adaptability, probably because the type of information provided by the service did not match their information needs. They perhaps expected the service to be able to provide information that could answer their questions and be directly applicable to their problem contexts. Participants with a TEACHING goal were less positive in using the evaluation criterion of 5 TIME SAVINGS, probably because they had a closer deadline for IPS and expected more quick responses.

Taylor's (1986) value-added model of information systems emphasized the shared value of a group of people within an information use environment (IUE). This model proposed that different groups of people in the same organization might evaluate the identical message differently due to the differences in the nature of information problems they typically deal with. Based on this premise, Taylor proposed an evaluation framework of information (value-added model) that might be commonly employed by users of information systems.

The study's findings provided indirect but supportive evidence for Taylor's (1986) *value-added model* – users' situational variable of capacity with an IPS, rather than their static variable of occupation, seems to be associated with the value they use in evaluating potential information, because people in different capacities tend to have different IPS goals. At the same time, the findings might extend the applicability of the model to a variety of people in different settings (IUEs). A person may move among multiple IUEs – be in the capacity of a student at a college, a teacher at a school and a parent at home – in everyday life. These different capacities may be associated with their IPS goals. Since the study's findings imply that IPS goals are associated with users' evaluation criteria, the same person may, eventually, exhibit different value systems for different capacities s/he acts on. Thus, a teacher may use a particular set of evaluation criteria in assessing information for her/his degree-seeking goal of writing a paper for a class assignment, but may use a quite different set of evaluation criteria in assessing information for her/his decision/action-planning goal of influencing the school districts' decision. If so, the value-added model might be expanded to cover "parameters of value" (Hall, 1977, 1981) that posit that the same person prefers different kinds of information services when s/he perform different functions.

SITUATIONAL VARIABLES ASSOCIATED WITH EVALUATION OF THE ASKERIC Q&A SERVICE

Above two sections reported the study's findings concerning quantitative and qualitative evaluation of the AskERIC Q&A Service for four situational variables of (1) whether participants did self-searching before making requests, (2) whether participants had experience in using the AskERIC Q&A Service, (3) perceived level of IPS skill, and (4) participants' IPS goal. This section explores patterns of association between quantitative and qualitative evaluation for these four variables.

SELF-SEARCHING BEFORE ASKERIC

The situational variable of whether participants did self-searching before AskERIC was compared with the distribution of the evaluation score, but no meaningful relationship was found between them. Therefore, whether participants did self-searching before making requests had no relationship with quantitative evaluation. On the other hand, participants who did self-searching before making requests tended to evaluate the outcome of the AskERIC Q&A Service as more adaptable and time-saving, while those who did not perform self-searching before making requests tended to evaluate noise reduction capability more positively. Thus, even though there seem to be some associations between participants' behavior of self-searching before sending requests and the evaluation criteria they used, such associations did not produce much difference in evaluation scores.

EXPERIENCE WITH THE ASKERIC Q&A SERVICE

The situational variable of whether participants had *experience in using AskERIC* was compared with the distribution of the *evaluation score*, and a negative relationship was identified between them. Therefore, whether participants had experience in using the AskERIC Q&A Service had some relationship with quantitative evaluation. For qualitative evaluation, participants who had no experience in using the AskERIC Q&A Service tended to evaluate the outcome of the AskERIC Q&A Service to be more positive particularly for quantity of the information. Those who had no experience in using the service, on the other hand, tended to evaluate it less positively particularly for user situations. These findings imply associations between three variables of participants' *experience in using the service*, *evaluation score*, and usage patterns of *evaluation criteria*. Specifically, first-time users might have given a higher evaluation score probably because their expectation level was relatively low and, therefore, appreciated the large amount of information provided. On the other hand, experienced users might give given a lower evaluation score probably because they had a higher level of expectation due to a more elaborate mental model and affection toward the service generated from past good experience. They might refer to their own faults or other user situations rather than service features or functionality when they receive imperfect information from the AskERIC Q&A Service probably because they still maintain a positive mental model of the service.

PERCEIVED LEVEL OF IPS SKILL

The variable of perceived level of IPS skill was compared with the distribution of the evaluation score, and a negative relationship was identified between them. Thus, there seems to be a negative relationship between perceived level of participants' IPS skill and their evaluation of the outcome of the service. For qualitative evaluation, participants who had a low level of IPS skill tended to use all evaluation criteria rather positively, while those with a high level of IPS skill tended to be more critical in using all evaluation criteria. In particular, those with a low level of IPS skill appreciated time savings provided by the service, while those with a high level of IPS skill were critical for adaptability of the service. These findings imply a pattern of associations between *perceived level of IPS skill, evaluation score,* and use of *evaluation criteria.* Participants who had a low level of perceived IPS skill might evaluated the outcome of AskERIC Q&A Service positively probably because they were dependent on other people in searching for information and availability of any help in self-searching changed their affective state from negative to positive. They appreciate time savings achieved by the use of the service probably because their self-searching on the Internet would take a considerably large amount of time. On the other hand, participants with a high level of perceived IPS skill might have a higher level of expectations on the service outcome, and expected information provided by the service to be able to answer their questions without making additional efforts.

IPS GOAL

The situational variable of participants' IPS goal was compared with the distribution of the evaluation score and identified some relationship between them – participants who had a DEGREE SEEKING goal tended to give a higher evaluation score compared to the other two groups. Therefore, some associations exist between participants' IPS goals and quantitative evaluation of the AskERIC Q&A Service. For qualitative evaluation, participants with a DEGREE SEEKING goal tended to use all evaluation criteria rather positively and appreciated the type of information provided and links to potentially relevant information. On the other hand, participants with a DECISION/ACTION PANNING GOAL tended to be critical for the adaptability of the service outcome, while those with a TEACHING goal tended to be less positive for time savings. Based on the analysis, there seems to be a pattern of association between participants' IPS goal, evaluation score, and their use of evaluation criteria.

These findings suggests that the AskERIC Q&A Service is more responsive to information needs of students who tend to look for information for DEGREE-SEEKING goal, because it emphasizes provision of references and links to sources likely to be useful for writing papers and literature review of theses. On the other hand, participants with a DECISION/ACTION PLANNING goal tended to be more critical for noise reduction and adaptability probably because the type of information provided by the service did not match their information needs. They perhaps expected the service to be able to provide information that could answer their questions and be readily applicable to their problem contexts. Participants with TEACHING goal were less positive for time savings provided by the use of the service, probably because they had a closer deadline for IPS and expected more quick responses.

SUMMARY

This chapter reported the study's findings concerning user-based evaluation of the outcome of the AskERIC Q&A Service. The evaluation and satisfaction scores reported by participants were very high and well correlated. The evaluation score was associated with three situational variables of (1) whether participants had experience in using the AskERIC Q&A Service, (2) perceived level of IPS skill and (3) participants' IPS goal.

The taxonomy of evaluation criteria of the AskERIC Q&A Service was developed based on the analysis of interview data using Taylor's (1986) *value-added model* as the initial framework. The final taxonomy was applied to categorize evaluation measures articulated by participants. The usage pattern of evaluation criteria indicated that participants generally appreciated the AskERIC Q&A Service for noise reduction, time saving, and DRI features. However, some participants were critical for noise reduction and adaptability of the service outcome as well as for user situations. The taxonomy was useful in identifying strength and weakness of the AskERIC Q&A Service and likely to be applicable on user-based evaluation of other information services including DRSs. The usage pattern of evaluation criteria was associated with four situational variables of whether participants did self-searching before making requests, whether participants had experience in using the service, perceived level of IPS skill, and participants' IPS goal.

Patterns of associations between evaluation score, usage pattern of evaluation criteria, and four situational variables were explored. The results indicated that participants who did self-searching before making requests tended to evaluate the outcome of the AskERIC Q&A Service as more adaptable and time-saving, while those who did not perform self-searching before making requests tended to evaluate noise reduction capability more positively. However, no relationship was identified between participants' self-searching before making requests and evaluation score they reported.

The situational variable of whether participants had experience in using the AskERIC Q&A Service was associated with both evaluation score and usage pattern of evaluation criteria. Participants who had experience in using the AskERIC Q&A Service reported a lower evaluation score compared to those who had no such experience. Participants who had no experience in using the AskERIC Q&A Service tended to evaluate the outcome of the AskERIC Q&A Service to be more positive particularly for quantity of the information. Those who had no experience in using the service tended to evaluate it less positively particularly for user situations.

The situational variable of perceived level of IPS skill was associated with both evaluation score and usage pattern of evaluation criteria. Participants who had a low level of perceived IPS skill tended to give a higher evaluation score and used most of evaluation criteria more positively than those with a high level of perceived IPS skill. Participants with a high level of IPS skill were critical for adaptability of the service.

The situational variable of participants' IPS goal was associated with both evaluation score and usage pattern of evaluation criteria. Participants with a DEGREE SEEKING goal tended to give a higher evaluation score and used most of the evaluation criteria more positively compared to those with DECISION/ACTION PLANNING and TEACHING goals. Participants with DECISION/ACTION PLANNING goal were critical for adaptability of the service outcome, while those with TEACHING goal less appreciative for time savings.

These results imply that qualitative and quantitative evaluations are associated with users' situational variables of experience in using the service, perceived level of IPS skill, and participants' IPS goal. The findings seem to support Taylor's (1986) contention that users in different *information use environments* (IUEs) evaluate information differently.

CHAPTER NINE

PATTERNS OF ASSOCIATIONS BETWEEN SITUATIONAL FACTORS AND TASKS REQUESTED OF ASKERIC Q&A SERVICE

This chapter reports study findings on associations between participants' situational factors and tasks they requested of the AskERIC Q&A Service based on findings reported in the previous four chapters. Accordingly, the chapter provides answers to the research question RQ3: *what patterns of associations, if any, are observed between users' situational factors and tasks requested of human intermediaries?* Assuming that IPS is a goal-oriented process and that user goal is structured on multiple levels, first section describes associations identified between multiple levels of user goals and tasks requested of intermediaries. Then associations between multiple levels of user goals and participants' situational variables are summarized. Finally, the chapter concludes with a conceptual model that synthesizes associations of user goals, users' situational variables, and tasks requested of human intermediaries in a graphic representation.

RELATIONSHIP BETWEEN MULTIPLE LEVELS OF USER GOALS AND TASKS REQUESTED OF HUMAN INTERMEDIARIES

Bandura's (1989) *social cognitive theory* defines goals as cognitively represented future events that motivate present human behavior, and proposes a *goal model* in which higher-level distal goals serve as general directive functions that generate immediate subgoals. As described in Table 6-1, this study identified following patterns of relationships between participants' IPS goals (higher-level distal goals) and their goals of using the AskERIC Q&A Service (immediate sub-goals).

- Many goals of using the AskERIC Q&A Service are unique to particular IPS goals. For example, deciding a topic of paper and obtaining known documents are unique to DEGREE SEEKING goal, while finding factual data as supporting evidence and getting experts' opinions are unique to DECISION/ACTION PLANNING goal.

- Some goals of using the AskERIC Q&A Service, including testing the service, learning how to use the system/service, and verifying own search processes/results are common goals shared among multiple IPS goals.

The above findings indicate that the conceptualization of the multiple levels of user goals of the goal model of Bandura's social cognitive theory (1989) fits well with participants' IPS processes. Consequently, users' *IPS goals* are considered as higher-level distal goals, while users' *goals of using a particular human intermediation* (i.e., The AskERIC Q&A Service in this study) are considered as specific subgoals generated by the higher-level distal goals. Based on this premise, tasks requested of human intermediaries were compared with (1) specific *subgoals* of using the AskERIC Q&A Service, as well as with (2) users' *IPS goals*.

ASSOCIATION BETWEEN GOALS OF USING ASKERIC Q&A SERVICE AND TASKS REQUESTED

Table 9-1 compares task codes on the category level assigned to participants' goals of using the AskERIC Q&A Service and to the tasks they requested of AskERIC.

Table 9-1: Tasks Requested of Intermediary and Goals of Using AskERIC Q&A* (N=62)

Task requested of intermediary	Participants' goals of using the AskERIC Q&A Service											
	A	B	C	D	E	F	G	A/E	C/E	D/E	E/G	Total
A												0
B	1	1	1	1								4
C	1	1	**16**	2	1	1			*1*	1	1	25
D			2	**12**								14
E												0
F		1	1				1					3
G							**2**					2
A/C/D				*1*								1
B/C	1		*3*	1				1				6
B/D				*1*								1
C/D			*2*	*3*								5
C/E											*1*	1
Total	3	3	25	21	1	1	3	1	1	1	2	62

* Numbers in bold represent number of the participants with full agreement of task codes; numbers in italic represent number of participants with partial agreement of task codes.

As shown in Table 9-1, a full agreement of task codes was obtained by a half of all participants, while 12 participants (19.4 %) obtained a partial agreement (one of multiple codes agreed). Thus, 43 participants' (69.4 %) task codes agreed at least partially between the tasks they requested of AskERIC and their goals of using the service.

The level of agreement was somewhat different depending upon participants' goals of using the service:

- TASK DEFINITION (A_DEF): four participants' goals of using the AskERIC Q&A Service were assigned this category, but none of them said they requested this task of the service.

- SEARCH-STRATEGY (B_STR): one participant out of three whose goals of using the AskERIC Q&A Service were assigned this category said she requested this task of the service.

- SOURCE-FINDING (C1_LOC/C2_ACC): twenty-two participants out of twenty-six whose goals of using the AskERIC Q&A Service were assigned this category said they requested this task of the service.

- CONTENT-HANDLING (D1_FAC/D2_SYN/D3_OPI): seventeen participants out of twenty-two whose goals of using the AskERIC Q&A Service were assigned this category said they requested this task of the service.

- EVALUATING (E_EVA): one participant out of four whose goals of using the AskERIC Q&A Service were assigned this category said he requested this task of the service.

The above findings suggest the following:

- When participants' goals of using the AskERIC Q&A Service were either SOURCE FINDING (C1_LOC/C2_ACC) or CONTENT HANDLING (D1_FAC/D2_SYN/D3_OPI), they tended to request all or a part of these tasks of the service.

- When participants' goals of using the AskERIC Q&A Service were either TASK DEFINITION (A_DEF) or EVALUATING (E_EVA), they tended not to request the task explicitly of the service.

Thus, users' goals of using the human intermediation (i.e., the AskERIC Q&A Service in this study) are likely to be associated with tasks requested of intermediaries in the following ways:

- When the users' sub-goal is to find relevant sources of information or to get factual data or opinions, they tend to explicitly request all or part of their sub-goals of the human intermediaries.

- When the users' sub-goal is to clarify their information needs (i.e., decide the topic of a paper; bring focus into a topic or issue, etc.), they tend not to explicitly request their sub-goals. When users' sub-goals are to decide the topic of a paper, they tend to request a search strategy or ask the intermediary to locate relevant sources of information by providing a tentatively selected topic, rather than explicitly disclosing their sub-goals. Users decide whether or not to pursue the topic for the paper by examining information provided by human intermediaries. When users' sub-goals are to bring focus to a topic or issue, they tend to ask for relevant sources of information for a broadly defined topic, rather than explicitly disclosing their sub-goals. They clarify or increase focuses of their information needs by browsing and/or following references or links provided by human intermediaries.

- When users' sub-goal is to evaluate their own search processes or results, most users request intermediaries to find relevant sources for the topic of the search, rather than disclosing their sub-goal. They collaborate in the search process and/or information provided by human intermediaries to evaluate their own search process/results.

Therefore, when users' sub-goals are to find relevant sources of information, to obtain factual data or to generate opinions, they tend to request part or all of their tasks to human intermediaries. On the other hand, when users' sub-goal is to define their own information needs or to evaluate their search processes or results, they tend to request tasks external to their sub-goals, without disclosing their own sub-goals. In addition, the following associations between users' subgoals and task requested are identified:

- First-time users tend to state their own subgoals rather than requesting a specific task in order to find out about available services.

- When the users' sub-goal was to test the system/service, they tend not explicitly mention the goal in the request messages.

Thus, the assumption that "users make requests of intermediaries based on their own goals" was supported by the data for the SOURCE LOCATING tasks and CONTENT HANDLING tasks. On the other hand, users are likely to request SEARCH-STRATEGY and/or SOURCE-LOCATING tasks when their own goals are either TASK DEFINITION or EVALUATING.

ASSOCIATION BETWEEN IPS GOALS AND TASKS REQUESTED

IPS goals and tasks requested of the AskERIC Q&A Service were compared at the sub-category level in order to identify patterns of association between them. The result is shown in Table 9-2.

Table 9-2: Tasks Requested of Intermediaries and IPS Goals (N=62)

Task Requested of AskERIC	IPS Goal				
	Degree seeking	Decision/action planning	Teaching	Other	Total
TASK DEFINITION (A_DEF)	0	1 (100.0 %)	0	0	1 (100.0 %)
SEARCH STRATEGY (B_STR)	5 (45.5 %)	1 (9.1 %)	3 (27.3 %)	2 (18.2 %)	11 (100.0 %)
SOURCE FINDING (C1_LOC)	15 (42.9 %)	15 (42.9 %)	2 (5.7 %)	3 (8.6 %)	35 (100.0 %)
SOURCE OBTAINING (C2_ACC)	**8 (88.9 %)**	0	0	1 (11.1 %)	9 (100.0 %)
FACT FINDING (D1_FAC)	2 (15.4 %)	**9 (69.2 %)**	1 (7.7 %)	1 (7.7 %)	13 (100.0 %)
SYNTHESIZING (D2_SYN)	0	1 (100.0 %)	0	0	1 (100.0 %)
OPINION GENERATING (D3_OPI)	0	**3 (100.0 %)**	0	0	3 (100.0 %)
EVALUATING (E_EVA)	1 (100.0 %)	0	0	0	1 (100.0 %)
ANY/ALL (F_ANY)	2 (66.7 %)	0	0	1 (33.3 %)	3 (100.0 %)
OTHER (G-OTH)	0	0	1 (50.0 %)	1 (50.0 %)	2 (100.0 %)
Total*	28 (45.2 %)	20 (32.3 %)	7 (11.3 %)	7 (11.3 %)	62 (100.0 %)

* Numbers in this column represent number of participants for each goal category.

In developing Table 9-2, multiple tasks were collapsed into respective task categories or sub-categories. Thus, tasks requested of AskERIC are not mutually exclusive. Table 9-2 indicates the following patterns of associations between participants' *IPS goal category* and the tasks they requested of intermediaries:

- Among nine participants who requested SOURCE-OBTAINING (C2_ACC) task, eight or 88.9 % had a DEGREE SEEKING goal.

- Among thirteen participants who requested FACT-FINDING (D1_FAC) task, nine or 69.2 % had a DECISION/ACTION PLANNING goal.

- All three participants who requested OPINION-GENERATIN (D3_OPI) task had a DECISION/ ACTION PLANNING goal.

Based on the above, it seems that the SOURCE-OBTAINING (C2_ACC) task tends to be requested by those whose goal was DEGREE SEEKING, and that the FACT-FINDING (D1_FAC) task and OPINION-GENERATING (D3_OPI) task tend to be requested by those whose goal was DECISION/ACTION PLANNING.

Thus, IPS goals and tasks requested of human intermediaries (i.e., the AskERIC Q&A Service) are likely to e associated in the following ways:

- The task of locating relevant sources of information is likely to be requested by users whose IPS goal is either DEGREE SEEKING (those whose capacity in IPS was as students looking for information to write papers or a thesis) or DECISION/ACTION PLANNING (people who are planning to make decisions or take action).

- The task of obtaining sources (document delivery or request of links to digital documents) is likely to be requested by users whose IPS goal was DEGREE SEEKING. They tend to assume that the fulltext ERIC documents are available on the Internet, and disappoint when they realize these documents are only available in print form or microfiche.

- The task of delivering existing lesson plans or providing links to lesson-plans on the Internet is likely to be requested by K-12 teachers whose IPS goal is TEACHING.

- The task of finding factual information/data (e.g., statistical or legal information/ data) is likely to be requested by users whose IPS goal is decision/action-planning.

- The task of providing opinions (i.e., request of expert opinions on specific problems or issues) is likely to be requested by users whose goal is decision/action planning.

Therefore, SOURCE LOCATING tasks and SOURCE OBTAINING tasks are likely to be associated with users' IPS goals of DEGREE SEEKING and TEACHING, while SOURCE LOCATING, FACT FINDING, and OPINION GENERATING tasks, are likely to be associated with users' IPS goals of DECISION/ACTION PLANNING.

ASSOCIATIONS BETWEEN IPS GOALS AND SITUATIONAL VARIABLES

This section summarizes patterns of associations identified between participants' IPS goals and their situational variables in previous chapters. Situational variables identified as associated with IPS goals are: (1) type of information sought, (2) goal generating factors, (3) capacity, (4) evaluation score, and (5) evaluation criteria.

ASSOCIATION BETWEEN IPS GOALS AND TYPE OF INFORMATION SOUGHT

Following relationships were identified between participants' IPS goals and types of information sought (Table 6-2):

- Participants with a DEGREE SEEKING goal tended to look for sources such as articles, books, and ERRC documents in order to write papers or the literature review of thesis.

- Participants with a DECISION/ACTION PLANNING goal tended to look for facts and sources to be used as evidence in order to support/reject a decision/action.

- Participants with a TEACHING goal tended to seek lesson plans and teaching materials. K-12 teachers tended to look for lesson plans to be used in designing their own lessons, and college/university faculty members tended to look for sources to be used as teaching materials.

Based on the above the study concludes that users' IPS goals and types of information they sought are related.

ASSOCIATION BETWEEN IPS GOALS AND GOAL GENERATING FACTORS

Following relationships were identified between participants' IPS goals and goal generating factors (Table 6-4).

- Participants with a DEGREE SEEKING goal or a TEACHING goal had their IPS goals imposed.

- Participants with a DECISION/ACTION PLANNING goal who were involved in collaborative IPS projects had their IPS goals imposed.

- Participants with a Decision/action Planning goal who were voluntarily involved in IPS activities tended to have their IPS goals generated by social influence.

- Participants with a personal or family related DECISION/ACTION PLANNING goal tended to have their IPS goals generated by personal interests.

Based on the above, the study concludes that there is a pattern of association between users' IPS goal and goal generating factors.

ASSOCIATION BETWEEN IPS GOALS AND CAPACITY

Following relationships were identified between participants' IPS goals and their capacity in the IPS (Table 6-9):

- Participants who acted as a student had a DEGREE SEEKING goal.
- Participants who acted as a parent had a Decision/action Planning goal.
- Participants who acted as a K-12 teacher tended to have a Teaching goal.
- Participants who acted as an administrator/manager tended to have a Decision/action Planning goal.

Based on the above, the study concludes that there is a pattern of relationship between users' IPS goal and their capacity in the IPS.

ASSOCIATION BETWEEN IPS GOALS AND EVALUATION SCORE

The following patterns of relationships were identified between participants' IPS goals and the evaluation scores they reported in assessing the responses they received from AskERIC (Table 8-10 and Table 8-11).

- Participants with a Degree Seeking goals tended to report a higher evaluation score compared to those with a Decision/action Planning goal or a Teaching goal.

Based on the above, the study concludes that users' IPS goals are related to the evaluation score they report. Users acting as a student and have a Degree Seeking goal are likely to give a higher evaluation score on the outcome of the AskERIC Q&A Service compared to those with a DECISION/ACTION PLANNING goal or a TEACHING goal.

ASSOCIATION BETWEEN IPS GOALS AND EVALUATION CRITERIA

Following patterns of relationships were identified between participants' IPS goals and their uses of evaluation criteria on the responses they received from AskERIC (Table 8-17).

- Participants with a DEGREE SEEKING goal tended to evaluate outcomes of the AskERIC Q&A Service more positive compared to those with a DECISION/ACTION PLANNING goal or a TEACHING goal.

- Participants with a Decision/action Planning goal tended to be more critical in evaluating the outcome of the AskERIC Q&A Service for noise reduction and adaptability.

- Participants with a TEACHING goal tended to be less positive in evaluating the outcome of the AskERIC Q&A Service for time savings.

Based on the above, the study concludes that there are some patterns of relationship between users' IPS goals and their uses of evaluation criteria.

ASSOCIATION BETWEEN GOAL OF USING A HUMAN INTERMEDIATION AND TASKS REQUESTED

This section summarizes patterns of associations identified between participants' goals of using the AskERIC Q&A Service and their situational variables in previous chapters. Situational variables identified as associated with participants' goals of using the AskERIC Q&A Service are: (1) whether they performed self-searching before making the requests, (2) whether they had experience in using the AskERIC Q&A Service, and (3) perceived level of their IPS skill.

ASSOCIATION BETWEEN SELF-SEARCHING BEFORE MAKING REQUESTS AND GOALS OF USING THE HUMAN INTERMEDIATION

The study identified the following relationship between self-searching before making requests and participants' goals of using the AskERIC Q&A Service (Table 7-3):

- Verify own search process was a unique goal of using the AskERIC Q&A Service for participants who performed self-searching before making the requests.

Based on the above, this research concludes that users' immediate subgoal of verifying won search process is unique to those who performed self-searching before using a human intermediation.

ASSOCIATION BETWEEN EXPERIENCE AND GOALS OF USING THE HUMAN INTERMEDIATION

The study identified the following relationship between participants' experience in using the AskERIC Q&A Service and their goals of using the service (Table 7-9).

- Test the AskERIC Q&A Service was a unique goal of using the AskERIC Q&A Service for participants who had no experience in using the service.

- Verify own search process was a unique goal of using the AskERIC Q&A Service for participants who had experience in using the service.

Based on the above, the study concludes that the immediate subgoals of using a particular human intermediation are likely to be associated with their experience in using it.

ASSOCIATION BETWEEN PERCEIVED LEVEL OF IPS SKILL AND GOALS OF USING THE HUMAN INTERMEDIATION

The study identified the following relationship between perceived level of IPS skill and participants' goals of using the AskERIC Q&A Service (Table 7-11):

- Verify own search process was a unique goal of using the AskERIC Q&A Service for participants who had a high level of perceived IPS skill.

Based on the above, the study concludes that perceived level of users' IPS skill is associated with their immediate subgoals of using a particular human intermediation.

ASSOCIATION BETWEEN TASKS REQUESTED AND EXPERIENCE IN USING THE INTERMEDIATION

The study identified the following associations between a positive image of the AskERIC Q&A Service and experience in using it:

- Relatively larger percentage of participants who had experience in using the AskERIC Q&A Service expressed a positive image of the service compared to those who had no such experience (Table 7-9).

- Participants who had experience in using the AskERIC Q&A Service tended to consider the service as reliable, time savings, and useful, based on their good experience. Some of them seem to have developed an attachment with the service (Table 7-10). On the other hand, participants who had no experience in using ERIC-related service or system tend to appreciate the fact that they could ask questions, but expressed no further description on the service's capability. Some experienced participants had become habitual users of the service.

Based on the above, the study concludes that users' experience in using a particular human intermediation help them develop a more elaborate mental model of it and some attachment such as familiarity, reliance, and trust of it, which lead them to become habitual users of it. Experienced users who had developed an elaborate mental model of an intermediary are likely to request tasks of the intermediary based on the mental model. Therefore, there should be some associations between whether users had experience in using a human intermediation and what they request of it.

A CONCEPTUAL MODEL OF ASSOCIATIONS BETWEEN SITUATIONAL FACTORS AND TASKS REQUESTED OF INTERMEDIARIES

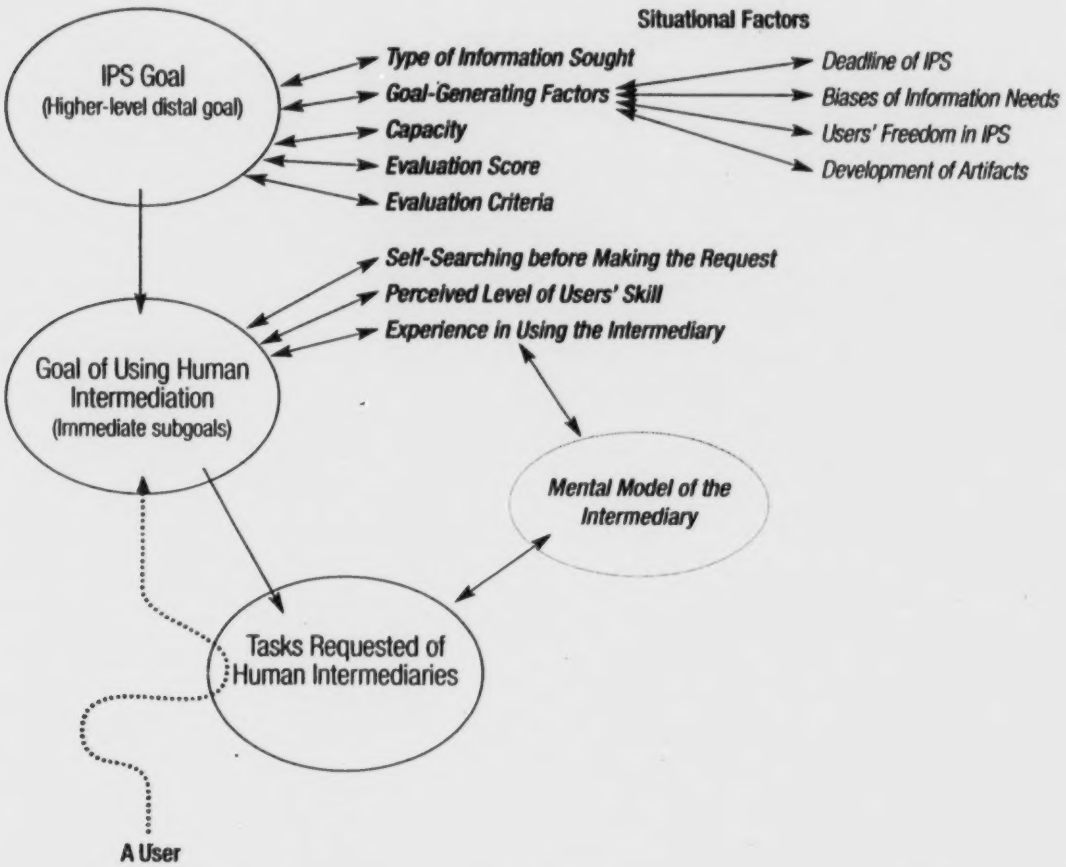
Associations among multiple levels of user goals, tasks requested of human intermediaries, and users' situational factors identified in this study and summarized above are synthesized into a conceptual model. Figure 9-1 graphically describes these associations.

The left side of Figure 9-1 describes the relationship between users' IPS goals (higher level distal goals) and goals of using a human intermediation (immediate subgoals) in which the former generated the latter. As presented graphically in Figure 9-1, users' IPS goals are associated with type of information sought, goal-generating factors, users' capacity in the IPS, evaluation score, and evaluation criteria they use. Goal generating factors are further associated with deadline of IPS, user biases in information needs, users' freedom in IPS process, and development of artifacts as the result of their IPS processes.

Users goals of using the human intermediation, considered to have been generated by their IPS goals, are associated with whether they performed self-searching before making the requests, whether they had experience in using the human intermediary, and users' perceived level of IPS skill.

The task requested of a human intermediary at the lower-left side of Figure 9-1 is generated by the combination of the goal of using the human intermediation and the mental model of the intermediary likely to have been developed by users' experience in using the intermediary.

Figure 9-1: Relation between Multiple Levels of User Goals, Tasks Requested of Human Intermediaries and Users' Situational Factors



As described in Figure 9-1, the study's results indicate that users who engage in an IPS goal choose to use a human intermediation at some point in their IPS process and ask the intermediary to perform a particular task in order to achieve the IPS goal. The task requested of the intermediary is generated by the combination of users goals of using the human intermediation and their experience in using it.

This conceptual model suggests that even though each individual users may have different information needs and their behavior in the IPS process may be quite different and situated, there exists patterns of relationships among user goals, situational factors, and tasks they request of human intermediaries. The identification of such associations may not only help achieve a better understanding of human IPS behavior but also may help human intermediaries to understand users' needs. Thus, the model might be useful in designing information retrieval services and systems. This issue will be discussed in the next chapter.

SUMMARY

This chapter reported study findings on associations between participants' situational factors and tasks they requested of the AskERIC Q&A Service based on findings reported in the previous four chapters, and provided answers to the research question RQ3: *what patterns of associations, if any, are observed between users' situational factors and tasks requested of human intermediaries.*

Relationships between multiple levels of user goals were identified. Some associations between goals of using a human intermediation and tasks they request of the intermediary were identified. When users' sub-goals are to find relevant sources of information, to obtain factual data or to generate opinions, they tend to request part or all of their tasks to human intermediaries. When users' sub-goal is to define their own information needs or to evaluate their search processes or results, they tend to request tasks external to these subgoals. First-time users tend to ask intermediaries to perform what they intend to do or their own subgoals in order to find out what services are available. Users with some experience in using the human intermediation tend to request a specific task based on the mental model of the intermediary developed by past experience.

Patterns of associations were identified between users' IPS goals and tasks they requested of human intermediaries. Users with a Degree Seeking goal are likely to request human intermediaries to find sources, while those with a DECISION/ACTION PLANNING GOAL tend to request providing factual information or opinions on the decision or action.

Patterns of associations identified between IPS goals and situational variables are summarized. IPS goals are associated with types of information sought, goal-generating factors, capacity in IPS, evaluation score, and evaluation criteria. Association between goals of using a human intermediation and users' situational variables are also summarized. Goals of using a human intermediation is related to whether users did self-searching before making the requests, whether users had experience in using the human intermediary, and perceived level of users' IPS skill.

Patterns of associations identified in the study among multiple levels of user goals, situational factors, and tasks users request of human intermediaries are synthesized in a conceptual model and graphically presented. The model describes how user goals and situational variables are associated with tasks requested of human intermediaries. The model may be useful not only in attaining a deeper understanding of users' IPS behavior, but also in designing information systems and services.

CHAPTER TEN

DISCUSSION AND IMPLICATIONS

This chapter will discuss the implications of study findings for AskERIC, information professionals and information system design. First, issues in limitations of the study in terms of informing to practices are addressed in order to define the limitations of the study findings in terms of their transferability to users of AskERIC and other information systems and services. Then, implications for AskERIC, information professionals and information system design, drawn from the study findings, are also discussed. The chapter concludes with future research questions generated by the study's findings.

The study's findings captured the complexity and dynamics of users' IPS processes that involve human intermediaries. The major findings of the study are summarized as follows:

- User goals are identified as consisting of multiple levels and have unique patterns of associations with how their goals are generated, types of information they seek, tasks they request, and how they evaluate responses or information they received from human intermediaries.

- Three situational variables including (1) whether users did self-searching before making requests; (2) whether users had experience in using human intermediation; and (3) users' perceived levels of IPS skill, have unique patterns of associations with their immediate subgoals of using the human intermediation, affective states in IPS processes, reasons for making the requests, types of tasks they request, and how they evaluate responses or information they obtained from human intermediaries.

- Users' good experiences of using a particular human intermediation generate a positive mental model of the intermediary that lead them to the action of using it again in their IPS processes. Repeated uses of intermediation develop a trust even in electronic environments and led to the habit of using it.

- Users' perceptions of "time" are notable all through their IPS processes, and associated with their affective states as well as initiation and termination of self-searching.

- Perceived convenience attained by IT is associated with the place where they perform self-searching and make requests.

- Outcomes of self-searching and human intermediation, as well as how user goals were generated, are related to modification of different levels of user goals.

- Opportunistic hope, accompanied by encountering human intermediation in self-searching, lead users to unplanned use of human intermediation in their IPS processes.

- Biased information needs, likely to be generated by social influence, seem to rise from "pretended rationality" – users developed their opinions based on their own merits but pretend as if their opinions were rational by using research findings or experts' opinions.

As summarized above, the study identified patterns of associations between users' situational factors and their uses of human intermediaries. The multiple levels of user goals, suggested by the goal model of Bandura's (1989) social cognitive theory and identified in users' IPS processes, as described herein, provide AskERIC, information professionals, and information system design with a framework which can form the basis of a better understanding of users' needs.

ABILITY OF STUDY FINDINGS TO INFORM PRACTICES

The approach and methodology employed in the study might demonstrate the limitation of the study's findings in terms of their ability to inform practices in information systems and services. This section addresses this issue using the four measures of naturalistic research, namely, credibility, dependability, confirmability, and transferability.

CREDIBILITY

Credibility refers to the isomorphism between the realities of the participants and the reconstruction made of them by the researcher (Guba & Lincoln, 1989). The study made every effort to avoid the Hawthorne effect and any rationalization bias that might possibly reduce the trustworthiness of participants' reporting. The study made conscious efforts to avoid introducing biases in interpretation by using triangulation and peer debriefing. However, I am aware of the following limitations:

- The study did not account for static variables of participants.
- The study accounted for only those situational variables and associations among them that were important and memorable to participants.
- The study might not have captured micro-level changes of situational variables since it did not employ real-time data collection techniques that are only possible by prolonged engagement with participants all through their IPS processes.

DEPENDABILITY

Dependability refers to the stability of the data over time or the extent to which an external reviewer can examine the process by which the researcher collected and analyzed the data (Guba & Lincoln, 1989).

The study employed a top-down strategy of the constant-comparative method in developing and refining categories, used inter-coder agreement check in developing taxonomies and categorizing tasks requested of human intermediaries, and kept memos to keep track of modifications in methodology, logistics, and insights to improve dependability. Thus, I am confident that the study could capture users' perspectives, but am still aware of the following limitation:

- This study did not account for perspectives of other people who were involved in participants' IPS processes including human intermediaries (i.e., the AskERIC information specialists) and other people (e.g., imposers, collaborators, etc.). Thus, the study captured only a partial picture of IPS processes viewed from users' perspectives.

CONFIRMABILITY

Confirmability refers to the extent to which the data and interpretations are based on the context reported by the participants in the study (Guba & Lincoln, 1989). A naturalistic approach was taken to keep the study data free from obtrusion. The top-down strategy of constant-comparative technique allowed the study to introduce new variables in addition to those drawn from existing models and findings. However, the study still maintains the possibility that my experiential knowledge might have influenced elicitation and interpretations of participants' articulations in the following ways:

- I have been involved as a human intermediary in a variety of users' IPS processes and accumulated thick experiential knowledge of the phenomenon of human intermediation. My experiential knowledge might have helped the study to identify some situational variables and associations among them that might not be possible for investigators without such knowledge.

- I who conducted telephone interviews am a trained interviewer and skilled in identifying contradictions and in exploring sources of inconsistencies by using ad hoc probe questions and triangulating participants' answers while conducting telephone interviews. Novice interviewers who follow the exact wordings of the interview guide might not have identified the same variables and associations even though they used the same methodology and the same instrument.

- The fact that I am not a native speaker of English might have affected the way participants responded in the telephone interview. I might have brought my own cultural biases to interpreting the interview data.

TRANSFERABILITY

Transferability refers to the extent to which study results are applicable to other contexts (Guba & Lincoln, 1989). I made an effort to fully capture the study context and presented a thick description to help determine the similarity of contexts with the study settings. The major study contexts for readers to be aware of are:

- Characteristics of the AskERIC Q&A Service (participants were recruited from its client): This is an Internet-based digital reference service (DRS) in the domain of education. Requests are responded to usually within two business days with potential sources of information rather than direct answers to specific questions. The Q&A Service is free of charge and operated as a part of the ERIC System affiliated to the U.S. Department of Education.

- Characteristics of participants: All participants lived in the United States and were age18 or older with a majority between 45 and 55 years of age (54.8 %), and predominantly female (79.0 %).

As stated above, the study had many advantages and disadvantages that might have implications for the applicability of study findings in the practice of information systems and services.

IMPLICATIONS FOR ASKERIC AND DIGITAL REFERENCE SERVICES

This section will provide implications and recommendations to the AskERIC Q&A Service based on the synthesis of the study findings reported in previous chapters, as well as additional data collected from participants of the study in telephone interviews. The first part of this subsection presents implications obtained from the study findings. The later part of the section presents the researcher's recommendations to the AskERIC Q&A Service based on participants' suggestions for improving the service.

IMPLICATIONS BASED ON STUDY FINDINGS

Above all, the study findings imply that users of the AskERIC Q&A Service – a free Internet-based digital reference service in the domain of Education – may represent more diversity compared to users of reference or online search services provided by conventional libraries. Major diversities are in how user goals were generated as reflected in their IPS goals, types of information sought, capacity in IPS, and evaluation criteria, in addition to geographic and cultural boundaries.

Highly Appreciated Features of Digital Reference Service

As opposed to conventional library-based reference or online search services where a face-to-face interview is available, human intermediaries of the AskERIC Q&A Service – an e-mail-based digital reference services – mostly rely on one-shot question answering (Lankes, 1998, White, 1999) based on relatively short and ambiguous request messages. Considering such limitations, it is remarkable that participants of the study evaluated the service outcome quite positively and expressed a high level of satisfaction with using the service. Positive evaluation and high level of satisfaction seem to be attained by accessibility, ease of use, quality of information provided, responsiveness, timeliness (within two business days), acknowledgment of the reception of requests with approximate response time, and humanized response messages with identifications of individual human intermediaries. Thus, the AskERIC Q&A Service should maintain these features and share them with other DRSs.

Situational Factors Helpful in Understanding Users' Information Needs

The study identified some associations between users' dynamic situations and their hierarchical goals that are reflected in their information needs. Thus, it may be useful for human intermediaries to identify these situational variables so as to gain a better understanding of users' information needs since typical request messages are short and ambiguous and interactive question-negotiation for clarification is very limited in e-mail-based DRSs. Important situational variables to be taken into consideration are:

- **Whether users did searching before making requests**: Users who did not perform self-searching may send ambiguous request messages probably because their information needs themselves are ambiguous. Users who did self-searching before making requests may want to verify their own search process/results by comparing them with responses or information provided by the service.

- **Experience of using the service**: Users who do not have experience of using the service may have least mental model of the service, and encountered it, or had it recommended or imposed by other people or media in selecting it. They may send open questions without specific tasks they want intermediaries to perform, because they may want to test the service. They may need explanations on service boundaries, how the service is operated, and how to read responses and follow-up references.

- **Perceived level of IPS skills**: Users with a low level of IPS skill tend to have negative emotion in self-searching and use human help all the time if it is available. Thus, any help of human intermediaries will be highly appreciated. They may have difficulty understanding the meaning of response messages and information in references provided. Therefore, they may need extensive explanations on basic things such as how to read citations, how to use search strategies provided if they perform their own search, and how to use interlibrary loan and other document delivery services.

- **IPS goals**: Users with the DEGREE SEEKING goal (looking for information to write papers for classes or theses for academic degrees) tend to look for potential sources of information including ERIC citations and Internet websites. They appreciate a large number of topically relevant sources. Users with the DECISION/ACTION PLANNING goal (make own decision, influence others' decision, plan own action, etc.) tend to look for factual information, experts' opinions, and research findings that support their contentions. They tend to appreciate direct answers to their questions, or a small number of relevant sources that include information directly applicable to their problem contexts. Users with the TEACHING goal, particularly K-12 teachers, tend to look for lesson plans to use in teaching their classes. They appreciate provision of lesson plans that fit their class in terms of the topic and the grade. If they cannot receive ready-made lesson plans, they need to develop them by themselves. They tend to be pressed to time due to a close deadline, and need an immediate response.

Thus, elicitation of these four variables may help AskERIC intermediaries better respond to users' information needs.

Alternative Ways of Eliciting User Situations

As stated above, the study identified four important situational variables of users that may help human intermediaries better understand users' information needs. There are two alternative ways to elicit these situational variables from users: interactive question-negotiation, and restructuring of the web request form.

Typical request messages are short in nature and sometimes quite ambiguous. The study identified that some participants want question-negotiation to be more interactive. The administration of the AskERIC Q&A Service considers direct human interaction to be important (Lankes, 1995) and the guideline of the question-answering of AskERIC suggests calling users when users' request messages need clarification (*System-wide Guide to AskERIC Question Answering*, 1999). However, interactive question-negotiation is limited in DRSs (White, 1999), and human intermediaries may need to make inferences to understand users' needs. This is probably because the introduction of e-mail-based interactive question-negotiation between users and human intermediaries may be cumbersome and require human intermediaries to spend more time for each user's request, which may, in turn, reduce the efficiency of the service.

The study also identified that some participants' information needs were clarified by reviewing partially relevant information provided by the AskERIC Q&A Service. This finding implies that users may be better off by receiving potential information quickly and reviewing it promptly, rather than spending their time in interactive question-negotiation in e-mail for their ambiguous information needs. Intermediaries should encourage users to ask again if provided responses do not meet users' needs.

Based on above, the study findings suggest that the AskERIC Q&A Service and other e-mail-based DRSs design a request form that help illicit important user situations'. However, intermediaries still need to call users, if possible, to clarify ambiguous information needs, rather than generate e-mail-based question negotiation, particularly when users' IPS goal is the DECISION/ACTION PLANNING that requires selected information adaptive to users' problem contexts.

Noise Reduction and Adaptability

Noise reduction and adaptability are identified as very important evaluation criteria to differentiate assessments of the question-answering service, employed by a majority of participants both positively and negatively. Under the criterion of noise reduction, three evaluation measures of ONLINE LINKAGE TO FULLTEXT, SELECTIVITY, and TYPE OF INFORMATION were identified as critical and may be improved by the following means:

- **ONLINE LINKAGE TO FULLTEXTS**: eight participants who used this measure in a negative sense unanimously expressed that they assumed all fulltext documents referred to by ERIC citations were available online on the Internet and tried to locate them by clicking ED numbers without success. They complained that these documents were only available in microfiche or printed form. On the other hand, I identified that some of the ERIC documents are available on the websites of authoring bodies. If ERIC citations were linked to these readily available ERIC documents, users may not need to put efforts in locating them or make requests to find ways to locate them. The researcher recommend that ERIC and other indexing and abstracting services provide online links from citations in bibliographic databases to readily available online documents and e-journals.

- **SPECIFICITY**: 14 participants (24.2 %) used this evaluation measure in a negative sense. Most of them were with the DECISION/ACTION PLANNING goal (make own decision, influence others' decision, plan own action, etc.). Participants with DECISION/ACTION PLANNING goal tended to look for information that is directly applicable to their problem contexts. They tended to look for research findings that support their point of view. Thus, they evaluated negatively the specificity of the information provided by AskERIC, because their information needs are defined not only by topics but also by point of view. If human intermediaries are to help support users' DECISION/ACTION PLANNING goal, they need to limit search output to those that exactly match users' problem contexts. The provision of terse conclusion in abstracts of empirical literature may also help users to locate research that support their contentions.

- **TYPE OF INFORMATION**: A majority of participants (35 or 60.3 %) claimed that the type of information provided by the AskERIC Q&A Service did not match what they expected and identified as using the evaluation measure of TYPE OF INFORMATION in a negative sense. This aspect of the service may be improved by (1) clarifying the service boundary and state that the service is in the business of providing potential sources of information but not direct answers or opinions; and (2) elicit the type of information users request in the request form. The former mean may help reduce inexperienced users' unrealistic expectations that the service may be able to provide factual information, answers to questions, or experts' opinions on users' problems. The latter mean may help clarify what users are looking for by specifying the type of information (e.g., empirical research, practical guides, technical reports, lesson plans, etc.).

Under the criterion of ADAPTABILITY, three evaluation measures of ANSWER TO THE QUESTION, USEFULNESS, and INTERACTIVITY were identified as critical in differentiating evaluations of the service. Negative uses of these measures indicate that participants who used these measures in a negative sense

[1] Some of the important situational factors are already included in the current AskERIC request form on its web page.

expected the AskERIC Q&A Service to provide information directly responding to their problem contexts. On the other hand, the basic policy of the AskERIC Q&A Service is to provide potential sources of information from the ERIC database or websites on the Internet, rather than directly answering questions or providing opinions on users' decision/action. A larger percent of participants with THE DECISION/ACTION PLANNING goal used these measures in a negative sense compared to those with the degree-seeking goal, indicating that the service is more responsive to information needs of users with the DEGREE SEEKING goal. In addition, negative uses of these measures indicate a gap between information needs of users with the DECISION/ACTION PLANNING goal and the policy of the AskERIC Q&A Service.

This gap may be reduced by the following means:

- State clearly the service policy of the AskERIC Q&A Service on the Q&A web page,
- Identify users' IPS goals in the web request form[2] and provide only those sources that directly address users' questions for those with the DECISION/ACTION PLANNING goal,
- Refer these requests that are apparently asking for direct answers to questions or expert opinions to other Q&A Service that can handle these requests.

10.3.2 RECOMMENDATIONS TO ASKERIC AND ERIC BASED ON PARTICIPANTS' SUGGESTIONS

Participants articulated their suggestions to improve the AskERIC Q&A Service in response to Q23[3] and Q35[4] in the telephone interview. These suggestions are summarized in Table 10-1 and Table 10-2.

[2] This mean has already been adopted in the web question form.

[3] Interview question Q23 asked' "How could AskERIC have improved your satisfaction level?"

[4] Interview question Q35 asked, "Do you have anything to tell me about AskERIC?"

Table 10-1: Recommendation to the AskERIC Q&A Service

Participants' suggestions	Description	Study Recommendation
Answer question directly	Five participants were looking for opinions or recommendations rather than citations or links.	1 Clarify the boundary of the service on the Q&A page 2 Provide links to other DRSs or domain experts who can answer the question or provide opinions. 3 Provide terse conclusions in abstracts or empirical research
Provide interactive question negotiation	Four participants said they received irrelevant information and assumed AskERIC intermediaries did not understand their questions.	4 Identify user goals and types of information users wanted in the Q&A page. 5 Adjust responses to reflect users' situation. 6 Call users when necessary to clarify their information needs.
Provide better explanation on how to obtain ERIC documents	Three participants did not know how to follow-up ERIC citations provided by AskERIC – they had a very limited perceived IPS skill.	Identify users' perceived level of IPS skills and provide explanation for low-skilled users on • Meaning of ERIC database search strategy included in the response, • How to perform ERIC search following the search strategy, • What is interlibrary loan and where/how to use it, and • All ERIC databases are copies of the same database.
Provide instructions on how to refine questions	Two participants had difficulty writing request messages or filling request form.	Provide well-written instructions on which dimension of information needs be presented in request form.
Clarify topical boundary	One participant wanted to know whether AskERIC could answer questions related to statistical methods and procedures.	Clarify the boundary of the topic or request/questions AskERIC Q&A Service can handle.
Provide a list of domain experts' e-mail addresses	One participant wanted to get e-mail addresses of domain experts who can answer her question.	1 Provide links to other DRSs or e-mail addresses to domain experts who can answer a particular question. 2 Make contracts with experts in educational domain to participate in the AskERIC Q&A Service.
Respond to requests	One participant said she did not receive any responses even though AskERIC responded.	Implement a procedure to make sure users received responses or information sent by AskERIC in order to prevent the phenomenon of lost responses.
Update links to other websites	A participant could not locate two websites when she was following links provided by AskERIC.	Update links to other websites periodically.

As described in Table 10-1, the study recommends the following improvements to the AskERIC Q&A Service.

Recommendation Regarding the Q&A Procedure

- Provide links to other Q&A Services or e-mail addresses to domain experts and other web-based Q&A Services who can answer questions, if requests or questions are out of the scope of the AskERIC Q&A Service,

- Call users when necessary to clarify their information needs (see System-wide Guide VI-2),

- Update links to other websites periodically (see System-wide Guide X-3-B),

- Implement a procedure to make sure that users received responses or information sent by AskERIC so that no response would be lost in the black hole of Cyberspace,

- Provide links to digital ERIC documents and journal articles indexed in the ERIC database if fulltexts are available on the Internet,

- Provide basic explanations for users with a low-level of perceived IPS skill on (1) meaning of ERIC database search strategy provided, (2) how to perform ERIC search following the search strategy provided, (3) what is interlibrary loan and where and how to use it, and (4) all ERIC databases are copies of the same database.

Recommendation Regarding the AskERIC Website

- Clarify the scope of the service (not to answer questions but to provide references and links to relevant sources) on the Q&A web page,

- Clarify the boundary of the topics of requests/questions AskERIC can handle on the Q&A web page[5],

- Provide instructions on what elements of information needs be presented on the request form. This arrangement has already been adopted in the web request form for user goals and self-searching before sending the requests. Three additional elements may be useful: (1) experience in using the Q&A Service, (2) perceived level of IPS skills, and (3) type of information wanted,

- Provide clear explanations on different ways to obtain fulltexts of ERIC documents.

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[5] This has already been reflected on the Q&A web page.

Table 10-2: Recommendation to the Administration of AskERIC and ERIC

Participants' suggestions	Description	Study Recommendation
Provide online links to fulltext ERIC documents	Eight participants requested instructions on how to obtain fulltext ERIC documents assuming that they are available online.	1 Develop digital ERIC documents on the web and links from citations in ERIC database to digital ERIC documents. 2 Provide links to e-journals if available from citations in ERIC database. 3 Provide instructions on how to download digital fulltext ERIC documents and e-journals on the web.
Provide more lesson plans	Four K-12 teachers requested lesson plans. One received useful lesson plans from AskERIC and used it in her class; three ended up designing own lesson plans.	Encourage GEM[8] to include more lesson-plans in ERIC database and other participating websites.
Provide a better navigation on searching ERIC digests	Two participants could not locate known ERIC digests by self-searching the AskERIC website.	1 Bring together all ERIC digests into one database, or 2 Merge all ERIC digests into the main ERIC database. 3 Improve indexing of ERIC database for users to be able to specify ERIC digests.
Provide more links from other website to AskERIC	Two participant suggested to provide links to AskERIC website from other education-related websites.	Initiate cooperative efforts with academic and professional organizations in educational domain to provide links to AskERIC.
Provide more detailed summaries in ERIC database	One participant did not get sufficient information in abstracts of ERIC to determine whether to obtain fulltext.	Provide terse conclusions in abstracts of ERIC databases.
Provide ERIC digests on major educational theories and models	One participant looked for Bloom's taxonomy. He wanted a list of categories and definitions, but not articles or documents.	Provide ERIC digests for major educational theories and models.
Provide clear copyright information on ERIC documents	One participant did not know the permission to reproduce ERIC documents does not imply permission for third parties.	Include the following in copyright statement of each ERIC document: • Permission to reproduce does not apply third parties, • # of copies permitted for educational use, and • Procedure to obtain permission to make additional copies with e-mail address of copyright holders.

As described in Table 10-2, the study recommends the following improvements to the administration of AskERIC and ERIC.

[8] Gateway to Educational Materials (GEM) is a website (www.thegateway.org) that provides links to lesson plans developed by K-12 teachers and other organizations.

Recommendation Regarding the Administration of AskERIC Service

- Initiate a coalition with other web-based Q&A Services and domain experts so as for AskERIC to be able to refer to them when requests are out of it's scope,

Recommendation on the Administration of AskERIC and ERIC database

- Generate ERIC documents in digital form and make them available on the Internet,
- Provide direct links from citations in the ERIC database to digital ERIC documents as well as to e-journal articles on the Internet,
- Provide terse conclusions in ERIC abstracts for empirical research in order to help users identify research findings that support their contentions,
- Bring together all ERIC digests into one database or merge all ERIC digests into the main ERIC database so that users can easily conduct self-searching of ERIC digests,
- Improve indexing of the ERIC database for users to be able to search by 'type of documents' such as ERIC digest, book, ERIC document, lesson-plan, journal article, empirical research, etc.,
- Assign the ED number to each of the ERIC digests,
- Develop ERIC digests on major theories and models in the domain of Education,
- Include the following information in the copyright statement of each ERIC document: (1) permission to reproduce does not apply to third parties, (2) number of copies permitted for educational use, and (3) procedure to obtain permission to make additional copies with e-mail addresses of copyright holders.

IMPLICATIONS FOR INFORMATION PROFESSIONALS AND HUMAN INTERMEDIARIES

This section will discuss implications of study findings for information professionals and other human intermediaries. Here, information professionals are not limited to librarians in physical libraries but also include a wide variety of information workers who support users' IPS processes in a variety of physical and electronic environments. Human intermediaries in this study may include a variety of people who are involved in IPS processes initiated by other people.

In order to provide foci for the discussion, five specific insights useful for human intermediaries are developed based on a synthesis of study findings:

(1) Even though human IPS processes that involve human intermediaries are very complex, there exist some seemingly systematic patterns of associations among users' situations. Important dynamic variables found to be associated with uses of human intermediation are: (1) multiple levels of user goals, (2) how users' goals were generated, (3) whether self-searching was done before making requests; (5) experience with the human intermediary; and (6) perceived level of users' IPS skill.

(2) Users have difficulty articulating their information needs clearly in request messages, particularly when they are in an early stage of the IPS process.

(3) Users' IPS processes are dynamic. User goals are stratified by multiple layers in which IPS goals (higher-level distal goals) give directions on users' immediate information needs (lower-level immediate goals) in response to outcomes of self-searching and human intermediation, as well as to encountering novel sources including human intermediaries. Imposition and social influence that generate user goals may limit users' control over their IPS processes.

(4) Users with different IPS goals are likely to use different evaluation criteria in assessing information obtained through the use of human intermediation. Users with a DEGREE SEEKING goal (e.g., writing papers, theses, etc.) tend to value references and links to a large number of documents, while users with a DECISION/ACTION PLANNING goal (e.g., making decisions, planning actions, etc.) tend to value a limited amount of specific information responsive to their contexts.

(5) Users may have biased information needs because of social influence and accompanying social legitimacy of 'pretended rationality.'

In the following, implications generated from each of the above insights are described. These implications might differ depending upon objectives of the service. Thus, a distinction is made between information services for "educational purposes" and "informational purposes" following White (1992). The objective of the former is to educate users to be self-sufficient information problem solvers, while that of the latter is to provide useful information responsive to the point of use in dynamically changing users' problem situations.

SITUATIONAL VARIABLES USEFUL IN UNDERSTANDING USERS' INFORMATION NEEDS

Patterns of associations between users' hierarchical goals and other situational factors as well as between these situational factors identified in the study may be useful for human intermediaries to obtain a better understanding of users' information needs. Hence a deeper understanding of users' information needs will eventually help them to be able to provide information that is directly responsive to users' problem contexts. Four variables were identified as directly associated with users' hierarchical goals:

Experience: A good experience of using a human intermediation generates a positive mental model of the intermediary that leads users to become repeated clients (habitual users). Users who have good experience bring new clients by recommending the intermediary to other people. On the other hand, inexperienced users have a less developed mental model and may test the intermediary to see what services are available.

Self-searching before: Users information needs tend to be focused through self-searching. Thus, users who use the human intermediary as the initial stage of their IPS tend to bring ambiguous requests. Human intermediaries may need to provide an interactive question-negotiation to help clarify users' needs or to engage in longitudinal collaborative IPS activities with them by providing potential information to help users clarify their information needs.

Perceived level of IPS skill: Users with a low level of perceived IPS skill need help all through IPS process and use human intermediaries whenever available. They have difficulty understanding basic concepts of information services, and need painstaking explanations.

Goal generating factors: Three factors identified in the study as generating users' IPS goals are associated directly and indirectly with users' IPS processes. Imposed IPS goals accompany deadline that generate time-pressure, and socially generated IPS goals may generate biases in users' information needs. Both of these factors tend to reduce the degree of freedom users have in their IPS processes that may lead to modification or replacement of information needs.

Patterns of associations among users' dynamic variables listed above may be useful in obtaining a deeper understanding of users' information needs by making inferences regardless of the objective of the information service. These variables may be elicited by using a well-designed request form, or by conducting an interactive question-negotiation.

HELP CLARIFY USERS' INFORMATION NEEDS

Users in an early stage of the IPS process tend to have difficulty articulating their information needs clearly in their request messages due to their ambiguous information needs. Some users expect human intermediaries to help clarify their information needs by interactive question negotiation. Some users do not express their exact information needs in request messages.

Information professionals and human intermediaries should help users to clarify their information needs by identifying user goals and other important situational variables through interactive question negotiation or using well-defined request forms.

DYNAMIC NATURE OF USERS' IPS PROCESSES

Shifts of users' immediate subgoals or information needs and the opportunistic nature of information seeking that characterizes the dynamics of users' IPS processes should be reflected in training and practices of information services provided by human intermediaries.

Information Services for Educational Purposes

Two different approaches might be appropriate for this setting:

Ad-hoc IPS Instruction: Provide instructions on how to identify and obtain required information that is responsive to users' problem situations at the point in time by helping clarify users' information needs through interactive question negotiation and help modify users' information needs by quickly providing potential information or information sources,

General IPS Instruction: Provide general instructions on how to evaluate interim self-searching results and relevant sources users may encounter in self-searching, as well as on how to incorporate them into users' subsequent IPS processes.

Information Services for Informational Purposes

Two different approaches might be considered for this setting:

Delegated Searching: Provide useful information or artifacts responsive to users' problem contexts at the point in use by reflecting users' IPS goals, preferences, and associated situational factors. This approach requires human intermediaries to be able to represent users' IPS goals as well as other relevant situational variables.

Collaborative IPS Projects: Proceed IPS processes effectively and efficiently as a collaborator of joint IPS projects by refining IPS goals and communicate effectively with users all through IPS processes to share the outcome of each step taken in the process and to identify users' dynamically changing situations. Develop artifacts by extracting and synthesizing relevant information, if necessary, to make it readily available at the point of use.

Both of the above approaches may require information professionals to learn from users' successful IPS processes (not in terms of search skills but in terms of conducting research, writing reports, communicating findings, making decisions, planning actions, etc.) some of which might be quite opportunistic and situated.

USER VALUES IN EVALUATING INFORMATION

Users with different IPS goals are likely to use different criteria in evaluating information. Users with a DEGREE SEEKING goal (looking for information to write papers for classes or theses for academic degrees) tend to value a large number of references and links to original sources, while those with a DECISION/ACTION PLANNING goal (make own decision, influence others' decision, plan own action, etc.) are likely to value a small number of specific research, factual information, and experts' opinions that support their decision or action.

Public information services in the Internet environment are likely to invite a wide range of user populations in terms of IPS goals. Thus, identifying users' IPS goals might be more important for information professionals working in such an environment to be able to estimate what kind of evaluation criteria users might use and how, so as to be able to provide information applicable to users' contexts. Identification of associations between user goals and evaluation criteria they use might help intermediaries to provide users with customized information products to the point of use.

The "User-Based Evaluation Criteria of the AskERIC Q&A Service (Table 8-12) developed in this study might have potential for information professionals to identify characteristics or value systems employed by users in relation to their goals. These criteria might also be useful in evaluating a variety of information services including DRSs.

ETHICAL CONSIDERATIONS IN SUPPORTING USERS' BIASED INFORMATION NEEDS

Users may have biased information needs due to social influence and "pretended rationality." The tradition of information science education has emphasized the "objectivity" of information professionals (Hafner & Camarigg, 1992; Blanke, 1989). Information services in electronic environments with diversity of users might have more potential to receive requests for biased information. Thus, information professionals who act as intermediaries may face a difficult ethical dilemma whether to provide information or potential sources of

information relevant to a general topic or issue that includes different perspectives to help users recognize their own biases or to provide focused information or sources that support users' biased contentions. A policy should be developed to clarify the role or stance to be taken by intermediaries.

IMPLICATIONS FOR SYSTEM DESIGN

This section discusses implications of study findings on information system design. The study identified shared characteristics of users' IPS processes involving human intermediation in an electronic environment. Findings of the study may provide useful insights into users' needs in IPS processes that may be incorporated into the design of information systems to reflect users' perspective.

Implications for intermediaries, discussed in the previous section, are directly applicable in designing "intelligent agents" – a software that would function in locating, evaluating, extracting and synthesizing information obtained through networked resources (Nardi & O'Day, 1996). By intentionally eliciting user goals and their important situational variables, making inferences of users' information needs, and reflecting them into IR processes performed by the software, future 'intelligent agents' may be able to provide information readily applicable to users' problem situations. In addition, eight issues useful in generating ideas for system design are developed based on a synthesis of study findings. In the following, each issue is discussed with a brief description of study findings and recommendations for system design.

FACILITATE CLARIFICATION OF INFORMATION NEEDS

Users in an early stage of the IPS process tend to have ambiguous information needs. Some of them expect human intermediaries to help clarify their information needs by interactive question negotiation. Others clarify their information needs by reviewing outcomes of self-searching and human intermediation. Information systems may help users clarify their information needs by incorporating question specification forms or interactive clarification functions that allows users to provide potentially important situational variables in addition to topic of interests.

MAKE IT POSSIBLE TO SPECIFY TYPE OF INFORMATION SOUGHT

Users describe their information needs not only by the topic, but also by the form of documents (e.g., journal articles, dissertation, downloadable multimedia, etc.) and the type of information (e.g., lesson plan, review of literature, empirical research, picture, e-poster, statistical data, library handbook, etc.). Information systems may be able to provide users with the capability of locating information by form and type of information. System designers need to identify forms and types of information needed by potential users of the system, since different people in different *information use environments* (IUEs) are likely to seek different forms and types of information (Taylor, 1986).

MAKE IT EASIER TO IDENTIFY RESEARCH FINDINGS AND ELICIT EXPERTS' OPINIONS THAT SUPPORT USERS' CONTENTIONS

Users with IPS goals generated by social inference tend to have biased information needs. Some of them seek research findings or expert opinions that support their contentions. Information systems may be able to provide users with the capability of easily locating such information by developing issue-based summaries of research findings; providing terse conclusions in abstracts of empirical research; offering enhanced browsing capabilities to locate information within documents; providing value-specific text summarization; and providing links to domain experts.

MAKE IT POSSIBLE TO VERIFY USERS' SEARCH PROCESSES AND RESULTS

Some users who need to perform a comprehensive search (e.g., for literature review of thesis) want to verify their search process and/or results at a later stage of their IPS process (e.g., after extensive self-searching). In order to support this need, assistant from human intermediaries is required.

MAKE IT EASIER TO LOCATE AND OBTAIN FULLTEXT DOCUMENTS FROM BIBLIOGRAPHIC ITEMS

Users often need to locate fulltext documents after they have identified metadata of potentially relevant documents by self-searching or using human intermediation. They assume direct links to fulltext digital documents in bibliographic databases. Information systems should be able to provide direct links from metadata or bibliographic items to fulltext digital documents by making more documents available in digital form.

MAKE IT EASY TO READ DOCUMENTS AND DIGEST/EXTRACT/SYNTHESIZE INFORMATION

Some users do not want to read massive documents in order to obtain information they need. They want to get short quick answers to their specific questions. Information systems might be able to support this need by incorporating links to domain experts and providing enhanced browsing capabilities of fulltext electronic documents.

MAKE IT EASY TO KEEP TRACK OF IPS PROCESSES

Users may go back to their own request messages and outcomes of self-searching to reflect on their own search process/results and to get feedback. Information systems should be able to provide functionalities to help users trace their search process.

SUPPORT INFORMATION SHARING ALONG WITH IPS PROCESSES AMONG COLLABORATORS OF JOINT IPS PROJECTS

Users who are acting as collaborators of joint IPS projects share plans, ideas, and information obtained from self-searching and human intermediation with other members of the projects along with the progress of their IPS processes. Information systems should be able to support users' collaborative IPS processes by providing the following functionalities to support users' information sharing.

Another avenue of facilitating users' IPS processes by incorporating the above findings may be to train users how to use a variety of functionalities already available in existing information systems in supporting their own IPS processes. This type of training may be offered as a part of bibliographic instruction by conventional libraries and education of future information professionals. In such cases, the importance of face-to-face communication between users and human intermediaries and possible information encountering at library shelves that may enrich users' IPS should also be emphasized.

FUTURE RESEARCH

The study explored the phenomenon of human intermediation from users' perspective within their broader IPS processes employing a naturalistic research design. As discussed earlier, I recognized the limitations of existing research and models of human intermediation, and intentionally designed this study to develop hypotheses to be tested in future research. Thus, the study findings should be considered as hypotheses concerning relationships among potentially important situational variables salient for users in their IPS processes.

Two different approaches are considered instrumental in extending transferability of the study findings and improving our understanding of users' perspective of human intermediation within their larger IPS processes:

SIMILAR APPROACH IN DIFFERENT CONTEXTS

Take a similar exploratory approach employing naturalistic research design and using a refined version of data collection instruments, and using taxonomies and models as the initial framework for data analysis to study different human intermediation in different environments to improve the transferability of the study's findings and conceptual model. User populations to be studied could be:

- Users of other DRSs and face-to-face reference services
- Users of fee-based information services,
- Users of human intermediation provided by people other than information professionals (e.g., domain experts, secretaries, graduate assistants, friends, family members, etc.),
- Multiple users who are involved in identical collaborative IPS projects.

STUDY DIFFERENT INFORMATION USE ENVIRONMENTS (IUES) IN AN ORGANIZATION

Intentionally sample users in different *IUEs* and compare their IR interactions (both self-searching and human intermediation) using a naturalistic design. This approach requires a close examination of a small number of users' IPS processes by prolonged engagement employing a variety of real-time and *post hoc* data collection throughout users' IPS processes. User populations to be studied may be:

- Researchers and managers in an identical organization, and
- Students, teachers, and administrators in an identical organization.

In both approaches, two variables not addressed in the present study that may be introduced are "cost concern" and "perceived level of domain knowledge."

Only after obtaining sufficient empirical evidence concerning relationships among situational variables may hypotheses be developed to test the generalizability of these relationships for the respective populations of users.

SUMMARY

This chapter addressed the limitation of the study, discussed practical implications of study findings for AskERIC, human intermediaries, and system design, and proposed future research ideas.

Issues in limitations of the study in terms of informing to practices in information services and system design were addressed in order to define in what extent the study findings apply for users of the AskERIC Q&A Service and other information systems and services. Implications for the AskERIC Q&A Service and the ERIC system were summarized based on study findings and suggestions provided by study participants. Implications were also provided for human intermediaries and information system design. Finally, the chapter presented future research ideas for extending the transferability of study findings and the conceptual model developed through the conduct of this research.

APPENDIX A

Appendix A
includes data collection instruments.

Appendix A1: Recruitment Message

Appendix A2: Reminder of Recruitment Message

Appendix A3: Outline of Interview Questions (sent to participants before the telephone interview)

Appendix A4: Interview Guide

Appendix A1: Recruitment Message

(This message was forwarded by AskERIC to a sample of AskERIC clients three days after receiving requests.)

Dear AskERIC Clients,

My name is Makiko Miwa, and I am from the Syracuse University School of Information Studies. I am conducting research that aims to investigate the use of AskERIC to help improve the AskERIC service. The study findings and recommendations will be submitted to AskERIC and interested respondents.

As a user of AskERIC service, you were selected as a potential respondent of the study based on a sampling of AskERIC clients who recently sent requests to the AskERIC Q & A Service. Would you please help us by participating in a telephone interview? Your input is essential to obtain a deeper understanding of clients' needs, which will lead to the better design of the AskERIC service. The interview will take 20-30 minutes. If you agree to participate in our study, I will send you the interview questions in advance by e-mail to help you prepare for our call.

Your participation in the study is voluntary, and all information will be kept confidential. Your name will not be used in any way, and no one will know about your specific answers except the study researchers. If you agree to participate, you can refuse to answer any questions we ask if you don't want to answer. Even if you agree to participate, you have the right to withdraw at any time without prejudice. The telephone interview will be conducted entirely at your convenience at a time you designate on the form below. As a memory aid for analysis, we would like to audio-record the interview. The tape will be erased once the study is completed.

We would like to interview you anytime between December 14-21. If you agree to participate, live in the U.S. and are over 18 years old, please fill the following Agreement Form and e-mail to Makiko Miwa at (xxxxx@mailbox.syr.edu). If you have any questions, please feel free to contact Makiko Miwa by e-mail.

If you cannot or do not want to participate in the telephone interview, tell us why using the Reason for Not Participating Form, so that we can put the responses we receive from other people into perspective.

---------- Agreement Form ----------

Yes, I agree to participate in the AskERIC Telephone Interview and am over 18 years old.

My name is:_____

My telephone # is: _____-_____-_____

Convenient times for me to talk to you are:

First choice: Date_____ **Time from** ____**AM/PM to** _____**AM/PM**

Second choice: Date_____ **Time from** ____**AM/PM to** _____**AM/PM**

The State I live/work in is _____. **(This information is needed to identify your time zone)**

---------- Not Participating Form ----------

No, I cannot/do not want to participate in the AskERIC Telephone Interview because (please put an asterisk (*) in front of all the responses that apply)

1. I live/work in a country other than the U.S.

2. I am less than 18 years old.

3. Other (please specify):_____)

Appendix A2: Reminder of Recruitment Message

(Forwarded by AskERIC to the same sample of AskERIC clients on the fifth day of the initial recruitment message)

Dear AskERIC Clients,

Five days ago, we sent you an e-mail message inviting you to participate in an AskERIC Telephone Interview. The purpose of the interview is to gain deeper understanding of clients' needs. You were selected as a potential respondent based on a sampling of AskERIC clients who recently sent requests to the AskERIC Q & A Service.

If you have already replied to the invitation, please accept our sincere thanks. If not, please do so today by filling either the Agreement Form or Not Participating Form attached to this message and send it to Makiko Miwa (xxxxx@mailbox.syr.edu). If you agree to participate in our study, we will send you the interview questions in advance by e-mail to help you prepare for our call.

Your participation in the study is voluntary, and all information will be kept confidential. Your name will not be used in any way, and no one will know about your specific answers except the study researchers. If you agree to participate, you can refuse to answer any questions we ask if you don't want to answer. Even if you agree to participate, you have the right to withdraw at any time without prejudice. The telephone interview will be conducted entirely at your convenience at a time you designate on the form below. As a memory aid for analysis, we would like to audio-record the interview. The tape will be erased once the study is completed.

If you have any questions, please feel free to contact Makiko Miwa by e-mail (mmiwa@mailbox.syr.edu).

Agreement Form

Yes, I agree to participate in the AskERIC Telephone Interview and am over 18 years old.

My name is:_____

My telephone # is: _____-_____-_____

Convenient times for me to talk to you are:

First choice: Date_____ **Time from** ____**AM/PM to** _____**AM/PM**

Second choice: Date_____ **Time from** ____**AM/PM to** _____**AM/PM**

The State I live/work in is _____. **(This information is needed to identify your time zone)**

Not Participating Form

No, I cannot/do not want to participate in the AskERIC Telephone Interview because (please put an asterisk (*) in front of all the responses that apply)

1. I live/work in a country other than the U.S.

2. I am less than 18 years old.

3. Other (please specify):_____)

Appendix A3: Outline of Interview Questions

(Sent to study participants before telephone interview)

Dear xxx,

Thank you very much for participating in our research. I'll call you on xx at around xx (am./pm.) of your time.

Following is the list of questions you will be asked during the AskERIC telephone interview.

Q1: Please describe briefly the request or question you sent to AskERIC.

Q2: Is the request for information your own or that of someone else? [You will be asked to select one response]

1. My own request => go to Q4
2. It is a joint project involving myself and other people => go to Q3
3. Someone else's request => go to Q3
4. None of the above (please explain)

Q3: Who is/are the other people?

Q4: How do/did you plan to use the information you requested of AskERIC? [You will be asked to select one response]

1. Research (what is the research about?)
2. Teaching (what is the teaching about?)
3. Planning (What is the planning about?)
4. Career preparation (what kind of career preparation?)
5. Decision making (what kind of decision making?)
6. Other (please explain)

Q5: Do you have a deadline or due date?

Q6: With 1 as least important, 5 as average, and 10 as very important, how important was it for you to find the information you were looking for?

Q7: What task(s) did you request of the AskERIC Question/Answering Service? [You will be asked to identify all that apply, then asked to select one major task]

A. Show me how to find information, how to use a system or service, or how to obtain known document(s).

B. Find appropriate sources such as Internet Web sides, documents, abstracts, or people for me.

C. Give me a specific fact as answer to my question.

D. Give me suggestions or opinions on my decision or action.

Q8: How many times have you ever used the AskERIC Question Answering Service, including this time? [You will be asked to select one response]

Approximately ___ times

The following questions ask you about your situation just before you sent the present question/request to AskERIC. Please try to recall that moment.

Q9: Please describe your physical environment (for example, where you were, the available information sources and/or search tools, etc.)

Q10: Please describe your situation at the moment just before you sent the present question/request to AskERIC (for example, provide the context of the search process, describe other people involved, and pressure you felt, and limitation of time or money, etc.)

Q11: Please describe any knowledge and/or skills you had to help you find information (for example, your knowledge about the topic of the search, your skills in using the Internet and other information sources, your level of confidence in your ability to locate the required information by yourself, etc.)

Q12: Please tell me what made you decide to use AskERIC to find the information this time.

Q13: Did you try to find information or an answer to your question from other sources before you sent the request to AskERIC? [You will be asked to select one response]

1. Yes I tried other sources => Go to Q14

2. No I consulted AskERIC Question/Answering Service first => Go to Q15

3. Other (please explain)

Q14: Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information before you sent your request to AskERIC.

Q15: Did you try to find information or an answer to your question from other sources after you sent the request to AskERIC? [You will be asked to select one response]

1. Yes I tried other sources => Go to Q16

2. No I did not try to find information after I sent my request to AskERIC => Go to Q17

3. Other (please explain)

Q16: Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information after you sent your request to AskERIC.

Q17: How did you feel while you were searching for information (for example, anxious, confident, frustrated, happy, helpless, etc.)?

Please answer the following questions after you examine the response you received from AskERIC Question/Answering Service.

Q18: Did you receive the answer to your question or information from AskERIC?

Q19: Please describe what you received from AskERIC.

Q20: How did you feel when you found you received the answer/information?

Q21: With 1 as poor, 5 as average and 10 as excellent, how would you evaluate the response/information you received from AskERIC?

Q22: With 1 as least satisfied, 5 as average, and 10 as very satisfied, how would you rate your level of satisfaction with the use of AskERIC this time?

Q23: How could AskERIC have improved your satisfaction level?

Q24: How did you (or will you) use the information you received from AskERIC?

Q25: Did you successfully meet your need for information that led you to make this request of the AskERIC Question/Answering Service? [You will be asked to select one response]

1. I've met my information need.

2. I've given up trying to meet my information need.

3. I'm still working on meeting the information need.

4. Other (please explain)

Q26: How did you feel when you met your information need (or when you gave up the search)?

Q27: Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information after you made a request of the AskERIC this time.

The following questions ask for some general background information about you.

Q28: What is your occupation(s)

Q29: How long have you been in your present primary occupation?

___ years ___months

Q30: In what capacity did you request information from AskERIC?

Q31: What is the highest level of education you have completed?

Q32: What is your gender?

Q33: How old are you? [You will be asked to select one response]

1. 18-25.

2. 26-35.

3. 36-45.

4. 46-55.

5. 56-65.

6. over 65.

Q34: Do you have anything to tell me about AskERIC?

Q35: Do you have any comments regarding this interview?

---------- End of the Interview ----------

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Appendix A4: Interview Guide

(Used by the Interviewer during the telephone interviews, Instructions to the interviewer is in italic in brackets; probe questions used by the interviewer are in italic)

Interviewee: _____ Date: _____ Time: _____

[After introducing yourself, read the following to obtain a verbal consent] Thank you for participating in the AskERIC Telephone Interview. The interview will take 20-30 minutes. Participation in the study is voluntary, and all information will be kept confidential. Your name will not be used in any way, and no one will know about your specific answers except the study researchers. You may refuse to answer any questions if you don't want to answer. Also, you have the right to terminate the interview at any time without prejudice.

Now I want to clarify your role in this study, OK? I want to know what YOU did, what YOU were thinking, and how YOU felt. There are no right or wrong responses. I', not interested in what are perfect or ideal information interactions, or what you think you should have done. I'm much more interested in your own personal responses, whatever they were. Do you know what I mean? Some people are very systematic when they go about doing something and some are intuitive and much less organized. It doesn't matter for this study. You just tell me how YOU responded and that would be most helpful for me. OK? I would like to audio-record this interview if you agree. The tape will be erased once the study is completed. May I start recording the interview? [start tape-recording]

The first few questions ask you about your most recent request to the AskERIC Question/Answering Service.

Q1: I understand that you made a request of AskERIC about a week ago. Please describe briefly the request or question you send to AskERIC.

Q2: Is the request for information your own or that of someone else? [You will be asked to select one response]

1. My own request => go to Q4

2. It is a joint project involving myself and other people => go to Q3

3. Someone else's request => go to Q3

4. None of the above (please explain)

Q3: Who is/are the other people?

Q4: How do/did you plan use the information you requested of AskERIC? [You will be asked to select one response]

1. Research (what is the research about?)

2. Teaching (what is the teaching about?)

3. Planning (What is the planning about?)

4. Career preparation (what kind of career preparation?)

5. Decision making (what kind of decision making?)

6. Other (please explain)

Q5: Do you have a deadline or due date?

1. Yes (when is the deadline?)

2. No

Q6: With 1 as least important, 5 as average, and 10 as very important, how important was it for you to find the information you were looking for?

Why?

Q7: What task(s) did you request of the AskERIC Question/Answering Service?

[pause to let the person respond]

- We have classified previous requests of AskERIC clients into four categories. I will read the four task categories. Please tell me which of these four categories is more close to the task you requested of AskERIC.

A. Show me how to find information, how to use a system or service, or how to obtain known document(s).

B. Find appropriate sources such as Internet Web sides, documents, abstracts, or people that might have relevant information.

C. Give me a specific fact as answer to my question.

D. Give me suggestions or opinions on my decision or action.

- Could you tell me which of the four is more close to your request?

[When the person select more than one category], which one was the most important for you]

- Did you request any other tasks? If so, please explain what you requested.

Q8: How many times have you ever used the AskERIC Question Answering Service, including this time? [You will be asked to select one response]

Approximately ___ times

The next few questions ask you about your situation just before you sent the present question/request to AskERIC. Please try to recall that moment.

Q9: Please describe your physical environment

[Pause to let the person respond in his/her own words]

- Where were you when you sent the request?
- What kind of search tools, such as computers, search engines, and browsers were you using?
- Were there any other sources and/or search tools available in the environment that are relevant to your request?
- [For respondents who sent request from work place]Does your work place have a library?
- [For respondents who sent request from home] Is your home close to a library?
- Were there any other factors in your physical environment that might have influenced your search process?

Q10: Please describe your situation at the moment just before you sent the present question/request to AskERIC

[Pause to let the person respond in her/his won words]

- Please tell me what made you engage in searching for information?
- Were there any other person(s) involved in the search process?
- Did anyone suggest that you use AskERIC?
- Did you feel any pressure in finding the information?
- Did you feel any social or inter-personal pressure in finding the information?
- Did you think you had enough time to complete the search if you do it by yourself?
- Did you have a monetary limit for finding or obtaining the information?
- Were there any other factors in your situation that might have influenced your search process?

Q11: Please describe any knowledge and/or skills you had to help you find information.

[Pause to let the person respond in her/his won words]

- How much did you know about the topic of the search?
- How confident did you feel in your ability to conduct the search if you did it by yourself?
- How familiar were you with locating information in sources other than AskERIC?
- How familiar were you with using libraries to find information?
- How familiar were you with using computers to search for information?
- Were there any other factors concerning your knowledge and skills that might have influenced your search process?

Q12: Please tell me what made you decide to use AskERIC to find the information this time.

Q13: Did you try to find information or an answer to your question from other sources before you sent the request to AskERIC?

1. Yes I tried other sources => Go to Q14

2. No I consulted AskERIC Question/Answering Service first => Go to Q15

3. Other (please explain)

Q14: Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information before you sent your request to AskERIC Question/Answering Service.

[for each source, ask] – When did you consult it? Why did you consult the source? How long did it take? What was the result?]

Order	Source	Why	When	How long	Result
1					
2					
3					
4					
5					

Q15: Did you try to find information or an answer to your question from other sources **after** you sent the request to AskERIC? [You will be asked to select one response]

1. Yes I tried other sources => Go to Q16

2. No I did not try any other sources after I sent my request to AskERIC => Go to Q17

3. Other (please explain)

Q16: Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information **after** you sent your request to AskERIC Question/Answering Service.

[For each source, ask] – When did you consult it? Why did you consult the source? How long did it take? What was the result?

Order	Source	Why	When	How long	Result
1					
2					
3					
4					
5					

Q17: Please describe how you felt while you were searching for information (for example, anxious, confident, frustrated, happy, helpless, etc.)

[Pause to let the talk in her/his own words]

- How did you feel when you begun the search for information?
- How did your feeling change while you were searching for information?
- How did your feelings change when you decided to use AskERIC?
- How did you feel after you sent the request to AskERIC?

Next few questions ask you about what you received from AskERIC.

Q18: Did you receive the answer to your question or information from AskERIC?

1. Yes => Go to Q19

2. No => [go to demographic questions (Q28-Q35)

Q19: Please describe to me what you received from AskERIC.

- Was it what you've requested?
- [If the answer is no, ask] why?

Q20: How did you feel when you found you received the answer/information from AskERIC?

Q21: With 1 as poor, 5 as average and 10 as excellent, how would you evaluate the response/information you received from AskERIC?

Why?

Q22: With 1 as least satisfied, 5 as average, and 10 as very satisfied, how would you rate your level of satisfaction with the use of AskERIC this time?

Why?

Q23: How could AskERIC have improved your satisfaction level?

Q24: How did you (or will you) use the information you received from AskERIC?

[Pause to let the talk in her/his own words]

- Did you develop any artifacts (summary, article, report, presentation, graphics, archives, etc.) based on what you received from AskERIC?
- [If yes] please describe the artifact(s) you have developed.
- With whom have (or will) you shared the information you received from AskERIC?
- How did (or will) you communicate the response that you received from AskERIC or the artifact you developed to the person(s)?

Q25: Did you successfully meet your need for information that led you to make this request of the AskERIC Question/Answering Service?

1. I've met my information need.
2. I've given up trying to meet my information need.
3. I'm still working on meeting the information need.
4. Other (please explain)

Q26: How did you feel when you met your information need (or when you gave up the search)?

Q27: Please tell me, in chronological order (from first to last), what people and/or sources you consulted to obtain the information after you received the answer/information from AskERIC this time.

[For each source, ask] – When did you consult it? Why did you consult the source? How long did it take? What was the result?

Order	Source	When	Why	How long	Result
1					
2					
3					
4					
5					

Next few questions ask for some general background information about you.

Q28: What is your occupation(s)

1. PreK-12 teacher
2. Faculty of college/university
3. Administrator/manager
4. Librarian/media specialist
5. Student
6. Homemaker
7. Other (please specify:_____)

Q29: How long have you been in your present primary occupation?

___ years ___months

Q30: In what capacity did you request information from AskERIC?

1. PreK-12 teacher
2. Faculty of college/university
3. Administrator/manager
4. Librarian/media specialist
5. Student
6. Parent
7. Other (please specify)

Q31: What is the highest level of education you have completed?

1. Less than high school

2. High school diploma or GED

3. Some college

4. Bachelor's degree

5. Master's degree

6. Certificate of Advanced Studies

7. Ph.D. or other Doctoral degree8. Other (please specify)

Q32: What is your gender

1. Male

2. Female

Q33: How old are you?

1. 18-25

2. 26-35

3. 36-45

4. 46-55

5. 56-65

6. Over 65

Q34: Do you have anything to tell me about AskERIC?

Q35: Do you have any comments regarding this interview? At any time during this interview, did you feel hesitant or not confident about your answers? Did any of the questions intimidate you? For instance, did you feel that your answers were different from other people's answers? If so, how? Is there anything else you want to add?

Q36: We will analyze the interview data. If we come up with any additional questions, can we send e-mail to ask these questions?

Q37: Are you interested in receiving the summary of this study?

End of the Interview/Questionnaire

Thank you very much for participating in our research.

APPENDIX B

Appendix B includes categories and definitions used and developed in the constant comparative data collection and analysis.

Appendix B1: Categories and definitions used to develop the Taxonomy of Tasks Requested of Human Intermediaries

(1) Big 6 Model

(2) Taxonomy of Tasks Requested of Human Intermediaries*(Revised in Pretest)

(3) Taxonomy of Tasks Requested of Intermediaries (Revised by 500 Past AskERIC Requests)

(4) Taxonomy of Tasks Requested of Intermediaries (Revised by the Request Messages Interview Data)

Appendix B2: Categories and Definitions Used to Develop the Taxonomy of Situational Factors Associated with the Use of Human Intermediation

(1) Taxonomy of Factors Associated with Users' Selection of Using Human Intermediation (Developed Based on the Literature

(2) Taxonomy of Potential Factors Associated with the Use of Human Intermediation (Revised in Pretest)

(3) Taxonomy of Potential Factors Associated with the Use of Human Intermediation (Final Taxonomy)

Appendix B3: Categories of Reasons for Choosing AskERIC Q&A Service

Appendix B4: Sub-Categories of Positive Image of the AskERIC Q&A Service

Appendix B5: Taylor's Value-added Criteria

Appendix B1 (1): Big 6 Model (Eisenberg & Berkowitz, 1995, p. 22 & 24)

Step	Skills	Components
1. Task Definition	Determine the purpose and need for information	1.1 Define the problem. 1.2 Identify the information requirements of the problem.
2. Information Seeking strategies	Examining alternative approaches to acquiring the appropriate information to meet defined tasks	2.1 Determine the range of possible sources. 2.2 Evaluate the different possible sources to determine priorities.
3. Location and Access	Locating information sources and information within sources	3.1 Locate sources (intellectually and physically). 3.2 find information within sources.
4. Use of Information	Using a source to gain information	4.1 Engage (e.g., read. hear. view) the information in a source. 4.2 Extract information from a source.
5. Synthesis	Integrating information drawn from a range of sources	5.1 Organize information from multiple sources 5.2 Present information.
6. Evaluation	Making judgments based on a set of criteria	6.1 Judge the product (effectiveness). 6.2 Judge the information problem-solving process (efficiency).

Appendix B1 (2): Taxonomy of Tasks Requested of Human Intermediaries* (Revised by Pretest)

Task Requested of Human Intermediaries (top level)	Component Tasks	Code	Examples
A: INSTRUCTIONAL	A1: Suggest appropriate sources (websites, databases, search tools, etc.)	A1SOU	*Where can I find information on xxx?* *Where is the right place to ask this kind of question?*
	A2: Show alternative approaches to locate the information or how to manipulate a search tool (e.g., IR system, search engine, etc.)	A2APP	*How can I find information on xxx?* *Is there a way that I can get this information?*
	A3: Show how to manipulate a particular source (e.g., database, website, etc.)	A3HOW	*How to identify journal sources in ERIC database?* *How can I acquire xxx written by yyy?*
B: SOURCE FINDING	B1: Find information for clients using a range of sources	B1INF	*Could you find information on xxx?* *Give me ERIC citation on xxx*
	B2: Find people (e.g., expert) for clients	B2PEO	*Please locate a specialist on xxx*
	B3: Provide a specific known document(s) to clients	B3DOC	*Please send me ERIC documents xxx*
C: FACT-FINDING/ OPINION-GIVING	C1: Provide suggestions on what to do to solve clients' information problem	C1SUG	*Please suggest topics of studies on which I can base my xxx* *How can I create xxx?* *What would you do if you plan a xxx?*
	C2: Fact-finding: Provide factual data typically extracted from a source(s) as the answer to clients' question	C2DAT	*Which states are covered under each region?* *What percentage of US colleges use plus/minus grading*
	C3: Present evaluated information or opinions for clients' action or decision	C3OPI	*Identify the pros and cons of this view?* *Give me your opinion on xxx?* *What is the current thinking behind the xxx?*
D: OTHER	D: Cannot be categorized	DUNK	*I am doing xxx. Please help me.* *I am doing a paper on xxx*

Note: the taxonomy was revised based on the pretest.

Appendix B1(3): Taxonomy of Tasks Requested of Intermediaries (Revised by 500 Past AskERIC Requests)

Code	Task Type	Big 6	Examples
TASK_ADEF	TASK DEFINITION: Provide suggestions on clarifying information needs (e.g., define or narrow down the topic of the search)	1	• Suggestions on narrowing my focus to find papers (articles) relating to faculty development processes for integrating technology into the curriculum. • Please suggest topic of research on which I can base my Master's thesis.
TASK_BSTR	SEARCH STRATEGY: Provide suggestions on approaches or strategies to find information. => If location of specific documents, use TASK_C2Acc	2	• I am researching the 'Headstart' program in the USA in the 1960s, intended to raise educational achievement. Please could you direct me on finding information? • I have typed in my search words, but the search returns titles and authors only. How do I get an abstract of the article?
TASK_C1LOC	SOURCE-LOCATING: Identify location of potential sources of relevant information (including electronic, print, human, organization, etc.) or provide metadata of these sources.	3.1	• I am conducting a research in Induction in Art Education. Could you please provide me with any relevant sites or articles of this matter? • I am interested in any lesson plans that deal with the letter Bb.
TASK_C2ACC	SOURCE-OBTAINING: Provide instructions on physically obtaining known sources (i.e., document delivery) or how to get fulltext of ERIC citations.	3.2	• How do I order documents from ERIC? How do I pay? How do I access ED and EJ citations (ex. ED417539 or EJ539215.) • Please tell me how I can get the book Russian Language Course for Peace Corps Trainees in Russia The author is Valery Bobov et al., and pub date is 1994.
TASK_D0EXT	EXTRACTING: Extract a part of information from sources. (e.g., definitions, quotations, etc.)	4.2	• Where did the line "all creatures great and small, the Lord God made them all" originate from - - where can I find it??? • What are the characteristics of fetal alcohol syndrome? Are there mild forms of this syndrome?
TASK_D1FAC	FACT-FINDING: Find factual information or data from sources (e.g., statistical, historical & geographic information/data or mathematical/scientific formulas)	4.2	• Is ZERO odd or even and WHY? • What are the New York State animal, stone, fruit, and vegetable? • Do I need registration in Maryland Department of Education to open a Computer Training Center?
TASK_D2SYN	SYNTHESIZING: Synthesize information obtained from multiple sources (e.g., provide summaries of a topic of the search).	5.1	• Could you please compile an interesting timeline starting with the end of the American Revolution and ending with the end of the nineteenth century? • What is trend; issues; concern of the use of technology in general and specifically in hardware & software in the use of promoting education?
TASK_D3OPI	DECISION/ACTION-SUPPORTING: Provide evaluated information or opinions/suggestions on decision or action.		• How important is it to use hands-on activities in a science classroom? • Is teaching an art or a science?
TASK_EEVA	EVALUATING: Evaluate IPS processes (e.g., adequacy of sources/keywords/ strategies)	6.2	• My topic is outcomes assessment in higher education and its influence on quality. I'm using ERIC, Proquest, Dissertation Abstracts International, and the AAHE assessment forum as resources. What if anything am I missing?
TASK_FOTH	OTHER: tasks that cannot be categorized above. This category may include questions about specific ERIC or AskERIC operations.		• I'm compiling a bound set of readings for a course that I will be teaching for about 22 students at xxx, and would like to include ERIC document ED 37890. What do I need to do to get permission to do this? • How does one request that a journal be indexed by ERIC?
TASK_GAMB	AMBIGUOUS REQUEST: request message does not clearly state what task is asked.		• Could you tell me some science experiments? Please only experiments. • I am doing a research paper on education motivation in Middle School students.

Appendix B1 (4): Taxonomy of Tasks Requested of Intermediaries (Revised by the Request Messages Interview Data)

Code		Task Type	Examples of Interview Data
Task_A_def		TASK DEFINITION: Provide suggestions on what to do to meet the information need (e.g., define or narrow down the topic of the search, etc.)	[No example is available because no interview data fall in this category]
TASK_B_STR		SEARCH STRATEGY: Provide suggestions on approaches or strategies to find information (e.g., how to find information, which keywords to be used, etc.). ⇨ If requesting locating or how to locate specific documents, use TASK_C2_ACC	Q1: I have sent four requests in a span of two weeks, approximately now. The first one that I sent, I believe was on time management in a high school math classroom.... Q7: I asked it to show me how to find information… Number 1. And that was it (P41).
SOURCE LOCATING TASK	Task_C1_loc	SOURCE FINDING: Identify potential sources of relevant information (including electronic, print, human, organization, etc.) or provide metadata of these sources. ⇨ If requesting physically sending contents of documents (e.g., lesson plans, ERIC documents, etc.), use TASK D1_FAC ⇨ If requesting sources but not for information, use TASK_F_OTH	Q1: I emailed questions to AskERIC about finding information on a study strategy called Slant. Q7: I asked for information that they could come up with that pertained to finding that study strategy. Q19: They sent a list of abstracts… one looked like a study…maybe for a master's degree or for a doctorate… another for couple of books, and articles… [Q: Was it what you requested?]: yes (P2).
	Task_C2_acc	Source obtaining: Provide instructions on physically obtaining known sources including ERIC documents (i.e., instructions on document delivery)	Q1: I was looking for a particular ERIC digest and I could not locate in the internet, I knew it had to be there because I had a copy and I could not find it. Q7: For a copy of that particular digest, since I could not locate it on my own (P9)
CONTENT HANDLING	TASK_D1_FAC	FACT FINDING: Find/provide factual information or data extracted from sources (e.g., statistical, historical, legal & geographic information/data, mathematical/scientific formulas, definitions of concepts, etc.)	Q1: I think the most recent one that I asked was in relationship to a reasonable time frame to do a behavioral assessment and functional analysis assessment following the request in writing. Q7: Specific data, most of my questions that I have asked have been very specific. And they answered the questions and then they have also, in addition to answering the questions, provided me with additional resources where I could get more information to… back up the answer that they gave me (P4)
	Task_D2_syn	SYNTHESIZING: Provide synthesized information obtained from multiple sources (e.g., provide summaries of a topic or documents).	Q1: The question that I asked was regarding the content of a library handbook. I would like to revise our school library handbook; we really don't have on right now… Q7: I think this is a five, "give me synthesized information…" (P26)
	TASK_D3_OP1	DECISION/ACTION-SUPPORTING: Provide evaluated information or opinions/suggestions on decision or action.	Q1: I was asking for your input on it. What you thought about 25 multiple choice questions if you thought that was a fair thing to do. Q7: Just your opinion or what they feel about our 25 multiple-choice test (P34).
Task_E_eva		EVALUATING: Evaluate IPS processes (e.g., adequacy of sources/keywords/ strategies).	Q1: The second… question… that I was asking… was the way I was progressing my research was logical… and I got back the answer, which… kind of said that "You pretty much done everything you can." Because I'm trying to do an exhaustive literature review of the topic. Q7: … just like triangulation in qualitative research (P48-2)
Task_F_oth		OTHER: Tasks that cannot be categorized above. This category may include questions about specific ERIC or AskERIC operations	Q1: I'm writing a textbook on music for one of the big music companies. And I wanted to know how I can best help them along with promotion and marketing of the book over the Internet and web and so forth. So I wanted to know what the sources are that I can tap. Q7: I wanted to see all the sources so that the ERIC directed me to sources that I can tap into for promotion of the book (P56)
Task_G_all		ANY/ALL: Any or All Types of Tasks: User requested any or all tasks of A through E.	Q1: I asked to have them make suggestions for possible places that would give grants for proposals that have to do with computers and girls. Girls using computers in high schools. Q7: All those (P5)

* In example column, text following Q1 is the answer to Q1; Text following Q7 is the answer to Q7

Appendix B2(1): Taxonomy of Factors Associated with Users' Selection of Using Human Intermediation (Developed Based on the Literature)

	Personal Factors	Social & Environmental Factors
Situational (Dynamic) Factors	PD1: Search stage (perceived results of previous stages) PD2: Perceived role of the user in the IPS PD3: Perceived characteristics of information problem PD4: Perceived types of information sought PD5: Perceived knowledge & skills held by the user PD6: Perceived accessibility of the IR system PD7: Perceived accessibility of the intermediary PD8: Perceived degree of trust placed in the intermediary PD9: Perceived time pressure PD10: Perceived cost of the IR interaction PD11: Perceived legitimacy of the IR interaction mode PD12: Perceived value of information sought	SD1: Availability of IR system SD2: Availability of potential intermediary SD3: Availability of computer SD4: Knowledge & skills held by potential intermediaries SD5: Interpersonal relationship with the intermediary SD6: Work responsibility other than IPS that demands the user's time SD7: Allocable budget for the IPS
Static Factors	PS1: Preferred mode of communication PS2: Communication apprehension PS3: Reading anxiety PS4: Educational level PS5: Gender PS6: Work experience PS7: Status PS8: Age	SS1: Information service policy SS2: Scope of common problems SS3: Shared criteria of value of information SS4: Shared mode of communication SS5: Behavioral grammar (unwritten rules)

Other factors

- OT1: Type of IR systems/databases used in the IR interaction
- OT2: Number of IR systems/databases used in the IR interaction
- OT3: Result of Previous Stages/Steps

Appendix B2 (2): Taxonomy of Potential Factors Associated with the Use of Human Intermediation (Revised by Pretest)

Kinds of Factors	Internal Factors	Social & Environmental Factors
Situational (Dynamic) Factors	A: Information Need A1: Information use orientation (goal) A2: Importance of obtaining information A3: Type of information requested B: IPS Action B0: IPS Stage B1: Searching before making request of AskERIC B2: Searching between making request and receiving response B3: Searching after receiving response B4: Evaluation of response or information B5: Information Sharing B6: Generation of Artifacts E: Cognitive State E1: Domain knowledge E2: IPS skills E3: Confidence of IPS F: Affective State G: Attitude toward the Intermediary	C: Physical Environment C1: place C2: Way of Sending Request C3: Availability of other relevant sources C4: Distance from libraries D: Social Situation D1: Role of respondent in the IPS process D2: Imposition of Information Needs D3: Experience of Using the Intermediary D4: Human influence D5: Social influence D7: Time-related factors (deadline & time pressure) D8: Money related factors (own pocket vs. availability of monetary sources)
Static Factors	PS1: Occupation PS2: Work experience PS3: Highest education completed PS4: Gender PS5: Age	

Appendix B2 (3): Taxonomy of Potential Factors Associated with the Use of Human Intermediation (Final Taxonomy)

Kinds of Factors	Internal Factors	Social & Environmental Factors
Situational (Dynamic) Factors	A: Information Need A1: Information use orientation (goal) A2: Importance of obtaining information A3: Type of information requested B: IPS Action B0: IPS Stage B1: Searching before making request of AskERIC B2: Searching between making request and receiving response B3: Searching after receiving response B4: Evaluation of response or information B5: Information Sharing B6: Generation of Artifacts E: Cognitive State E2: IPS skills E3: Confidence of IPS F: Affective State	C: Physical Environment C5: Convenience of IT D: Social Situation D1: Role of respondent in the IPS process D2: Imposition of Information Needs D3: Experience of Using the Intermediary D4: Human influence D5: Social influence D7: Time-related factors (deadline & time pressure)
Static Factors	PS1: Occupation PS2: Work experience PS3: Highest education completed PS4: Gender PS5: Age	

Other Factors

- Reasons for selecting AskERIC Q&A
- Causal & temporal relationships between reasons for selecting AskERIC Q&A
- Evaluation criteria used to assess AskERIC responses

Appendix B3: Categories of Reasons for Choosing AskERIC Q&A Service

CODE	Definition	Example of Data Instance
A1 PLANNED USE	Participant planned to use the service	That was part of my plan, my research plan (P5)
A2 SELF-SEARCHING FAILURE	Self-searching was not successful	I used ERIC database and looked and didn't find anything (P7)
MEDIATED-SEARCHING-FAILURE	Mediated/delegated searching was not successful	The librarian did check this website… and didn't find anything (P38)
A3 ENCOUNTER ASKERIC	Participant encountered AskERIC unexpectedly during self-searching	I just happened to come across it. (P47)
A4 HABITUAL USE	Use of the AskERIC Q&A Service is a habit of the participant. (every time, always, usually, all the time, ever since, fell into it, habit, etc.)	Every time I've asked a question, they made a very conscientious effort to get the answers that I needed (P4).
A5 TRYING NEW SOURCE	Participant used the AskERIC because it was a new source for her/him.	I thought it's new, a new avenue for me (P27)
A6 EXHAUSTED SOURCES	Participant exhausted all relevant sources in self-searching	I think I had pretty much exhausted what I could do (P35)
A7 ERIC SEARCH	Participant did ERIC database search on the AskERIC website	Using ERIC the way I was using it, then I decided, maybe I was using it wrong, so I should ask (P11)
A8 INTERNET SEARCH	Participant did Internet search	It came up in a web search (P16)
B1 NEED INFORMATION	Information need led the participant to use the service	The desire to find the explanation about the child health (P15)
B2 VERIFY OWN SEARCH	Participant wanted to verify own search result	Just to collaborate to see if I missed any important sources (P43)
B3 NEED HELP IN IPS	Participant used the service because s/he needed help/assistance	I had attempted by myself but couldn't find it, so I sought additional assistance (P9)
B4 TESTING SERVICE	Participant wanted to test the service	It was more so out of curiosity to see what I could find on this (P22)
C1 KNOW ASKERIC	Participant used the AskERIC Q&A Service because s/he knew the service	I've seen it on there and I've never tried it. So I thought I would try it (P65)
C2 KNOW ERIC	Participant used the AskERIC Q&A Service because s/he knew the ERIC database/system	Since I knew about ERIC, it sounded like it might be a useful resource (P16)
C3 LIMITED IPS SKILL	Participant used the AskERIC Q&A due to the limitation of his/her search skill (including terminology)	I was quite new to the Internet, so I really didn't know where to go (P45)
C4 REMEMBER ASKERIC	Participant used the AskERIC Q&A because s/he remembered it.	I was just looking back over a long a list of favorites that I had put on my education category… I just sort of remembered (P3)
C5 REMEMBER ERIC	Participant used the AskERIC Q&A because s/he remembered ERIC	As soon as I saw the word ERIC I said: Ah ha, I know all about this (P8)
C6 TOPIC/DOMAIN MATCHED	Participant used the service because his/her topic of the search is education	It is a good source for current information in the field of adult education (P9)
C7 POSITIVE IMAGE OF ASKERIC	Participant used the AskERIC Q&A because s/he had a positive image of the service	I just use AskERIC all the time. I just find it to be a very reliable source (P46)
C8 POSITIVE IMAGE OF ERIC	Participant used the AskERIC Q&A because s/he had a positive image of the ERIC database/ system.	[ERIC] is a good source for current information in the field of adult education. So I use it frequently (P9)
C9 NEGATIVE IMAGE OF LIBRARIES	Participant used the AskERIC Q&A, because s/he had a negative image of libraries	I have gone to a public library and tried to search myself… it just takes forever …So, it's much easier this way (P2)
C10 NEGATIVE IMAGE OF INTERNET	Participant used the AskERIC Q&A because s/he had a negative image of the Internet search	On the net right now, you can see some information, but you are not sure it's true. But ERIC you can be certain of (P43)
NEGATIVE IMAGE OF SELF-SEARCHING	Participant used the AskERIC Q&A due to a negative image of self-searching	I've searched ERIC for keywords before… I felt better about being able to ask a specific question (P58)
C11 LOGICAL CHOICE	Participant thought using the service is a logical, reasonable, or appropriate method	It seems like a logical place to start, so that is what I did, I just went over to AskERIC (P24)
C12 INTUITION	Participant used the AskERIC Q&A because of her/his intuition	I sort of used search engines, used my own intuition on what might be good places (P5)
D1 FRUSTRATION OF SELF-SEARCHING	Participant used the AskERIC Q&A because s/he felt frustration with self-searching	I felt a little frustration, because I was taking me a while to find it (P57)

CODE	Definition	Example of Data Instance
D2 OPPORTUNISTIC HOPE	Participant had an opportunistic hope, an optimistic but ambivalent feeling of hope.	We just came across this and I was like "this is cool, let's just do this (P47)
D3 NOTHING TO LOSE	Participant used the service because s/he loses nothing by using it	I basically had nothing to lose by submitting a quick question while I was there (P36)
CONFIDENT USING ASKERIC	Participant used the service because s/he had confidence in using it.	Because in the past, I had been very successful using AskERIC and I felt confident in asking this time as well (P25)
E1 IMPOSITION OF ASKERIC	Participant was compelled to use the AskERIC Q&A service.	Because part of the research paper required us to use AskERIC (P41)
E2 IMPOSITION OF ERIC	Participant was compelled to use the ERIC databaseThe	instructor of the class told us to look for ERIC [database] (P55)
E3 GOOD EXPERIENCE ASKERIC	Participant's good experience of using the service lead her/him to use it again	I had used it before to have them help find an answer to a question and it was quite useful (P2)
E4 GOOD EXPERIENCE ERIC	Participant's good experience of using the ERIC system lead her/him to use the Q&A Service	I've used the ERIC resources before (P52)
E5 GOOD EXPERIENCE HUMAN INTERMEDIARY	Participant's good experience of using intermediaries lead her/him to use the Q&A service.	Since I was probably I was in the library [and get help of librarians] long before there was an AskERIC so I… know how to appreciate it (P57)
E6 HUMAN INFLUENCE ASKERIC	Participant had it suggested by other people that s/he use the service for the IPS captured in this study	I had talked to one of the principals at the grade school who suggested it (P28)
E7 HUMAN INFLUENCE ERIC	Participant had it suggested by other people that s/he use the ERIC database in AskERIC website	I had known from other people in my program that they had used [ERIC] database (P23)
E8 REPUTATION ASKERIC	Participant used the service because of its reputation	People have talked about how wonderful it is and how you can always find stuff (P10)
E9 MEDIA INFLUENCE ASKERIC	Media influence led the participant to use the AskERIC Q&A Service	Based on what I read from the article that was going to provide information from a variety of experts and from other parents giving their opinions (P15)
E10 TIME LIMITATION	Participant used the AskERIC Q&A because of time limitations.	I went so many links and I realized that I didn't have time to research all of those (P14)
STEALING TIME	Participant used the service because s/he was using time assigned for other tasks.	I was doing this at my workplace and that's not part of my regular job… However, we have access to a made me want to get the information quickly.. Because I was on someone else's time by being at my job (P25)
MONEY CONCERN	Participant used the service because of a money related reason	It's free (P17)
VICARIOUS LEARNING	Participant used the service because s/he learned about it from sample responses.	My professor showed me [a sample response of the service] she had done, and variety of resources that were e-mailed back to her… name of the researcher who worked on her question and e-mail address for that person, really impressed me (P59)
F1 CONVENIENCE	Participant used the AskERIC Q&A because it was convenient to do IPS without going out and/or using IT	It was just convenient because I was at my house (P58)
F2 BOOKMARKED	AskERIC Q&A/website was bookmarked.	I did bookmark, this is my first flip through (P17)
F3 ASKERIC AVAILABLE	Participant used the service because it was available Because the service was available (P14)	TOP SITE IN CATEGORY Participant used the service because it was at the top of the list of links in a category. I went to Netscape, I clicked on education and research and that was one of the top sites listed that came up (P40)
IPS TASKS BE DELEGATED	Participant chose the service because she thought it to be a tool for delegated IPS tasks	It is a tool you can use [for IPS tasks] when you can send queries out and people can be working toward getting you the exact information (P40)
FEDERAL SOURCE IS GOOD	Participant chose the service because s/he believed that federal information sources are good	In general, the federal sources of information are good (P17)
GOOD NAME	Participant chose the service because the name was good	I think, the name is very good (P54)
OWN AGE IS TOO OLD TO DO SELF-SEARCHING	Participant thought s/he was too old to perform self-searching	I'm pretty rusty. A lot of things have changed in the last couple years involving computers and searches… I'm too old to be doing this (P59)

Appendix B4: Sub-Categories of Positive Image of the AskERIC Q&A Service

Code	Definition	Examples of Data Instances
Hx712_reliable	Participant referred to reliability, credibility, and/or trustworthiness of the AskERIC Q&A Service as a reason to select it.	... every time I've asked a question, they've made a very conscientious effort to get the answers that I needed. And so because of that, for this last question that I asked, I went ahead and I used them again (P4). I just use AskERIC all the time. I just find it to be a very reliable source (P46)
Hx718_time-saving	Participant referred to promptness or time-saving as a reason to select the AskERIC Q&A Service	... it takes two days. So that's very quick... I'll take the information that I've received from AskERIC to the library and then they'll do an interlibrary search for it and, and... I have the materials, articles, books, whatever I need within a matter of days (P2). I decided to go ahead and send that AskERIC the information. Because it said that they get back to me in 24 to 48 hours (P51).
Hx713_useful/ helpful	Participant considered the AskERIC Q&A Service and/or the information s/he would receive from it would be useful, helpful, valuable, and/or adaptable to her/his situation.	I usually ask... go to AskERIC over email because it's, it's, it helps me do the work. As opposed to going to ERIC straight on (P5). Because the information I usually find as relevant to AskERIC to the age of students I teach (P63).
Hx714_skilled-intermediary	Participant referred to intermediaries' skill and/or knowledge of the AskERIC Q&A Service as a reason to select the service.	... because it would involve a human intelligence rather than just machines doing keyword matching (P16). ... because I'm sure that they've done this much more than I have. So that what made me to decide, because I thought they probably are the experts, me being the beginners, they would have more skills at locating it (P45).
Hx715_can-ask-question	Participant referred to the fact that users can ask questions (in stead of using just keywords) as a reason to select the AskERIC Q&A Service.	I don't think I know how to use the database what that well. But I saw you could ask the question and they would send you back the information so that what I did (P1). ... it was nice that this was actually something you could ask a question to rather than simply do your best and come with whatever (P7).
Hx717_high-quality	Participant referred to the quality of the AskERIC Q&A Service or its response as a reason to select the service. (e.g., of quality, complete, thorough, good, etc.)	... because of the credibility that ERIC has with me. And I presumed that if they had a service like that available, that it would have been of quality (P20). I had had experience [of using ERIC database] years ago before we had the Internet to the extent that we have now and I always got very good results and felt like the quality was would still be there (P40).
Hx711_easi-ness	Participant referred to easiness of using the AskERIC Q&A Service as a reason to select the service.	... it's much easier this way (P2). ... having AskERIC, asking someone I thought that it would be easier if I have somebody pointing me in the right direction. (P50).
Hx710_familiar	Participant referred to her/his familiarity with the AskERIC Q&A Service as a reason to select the service.	It's something that I'm familiar with so I used it (P5). I think I was familiar with it (P32).
Hx716_respond	Participant referred to her/his supposition that the AskERIC Q&A Service would respond as a reason to select the service.	Seems to respond (P5). I've used that before. So I thought I would get something (P32).
Hx719_good-search-tool	Participant referred to being a good search tool as a reason to select the AskERIC Q&A Service.	It looked like a good educational research tool and this was the question I wanted to know so it looked like a good resource (P17).
Hx718_free	Participant referred to "free of charge" as a reason to select the AskERIC Q&A Service.	I mean what do I have to loose, it's free (P5).

Appendix B5: Taylor's Value-added Criteria*

Value-added Criteria	Measure	Definition
EASE OF USE: It "has to do with system elements which, in physical, human, or software terms, tend to reduce difficulty in using the system" (P. 55).	BROWSING	The capability of a system to allow a client to scan an information neighborhood, with the probability that the client will serendipitously find information,of value.
	FORMATTING	The physical presentation and arrangement of data/information in ways that allow more efficient scanning and hence extraction of items of interest from the store.
	INTERFACING	The capacity of the system to interpret itself to users.
	INTERFACING I (mediation)	The menus used to assist users in getting answers from the system.
	INTERFACING II (orienting)	The means used to help users understand and to gain experience with the system and its complexities.
	ORDERING	The value added by initially dividing or organizing a body of subject matter by some form of gross ordering, such as alphabetization, or large groupings.
	PHYSICAL ACCESSIBILITY	The process of making access to information stores easier in a physical sense.
NOISE REDUCTION: Includes three processes of (1) "excluding or withdrawing information"; (2) "including or supplying information within some (possibly rather large) boundaries"; and (3) precision, or "focusing on specific data or facts" (p. 57-58).	ACCESS	The values added by the intellectual technologies that provide the systematic meanings, based on subject matter, or narrowing the information universe to a set of data and information which have some probability of containing material that is wanted or needed. Different kinds of intellectual access provide different sets of the subject universe.
	ACCESS I (Item identification)	The value achieved by the identification of any information chunk or discrete piece of data by systematic physical description and location information.
	ACCESS II (Subject description)	The provision of a subject description through access points such as index terms, descriptors, and names.
	ACCESS III (Subject summary)	The result of processes which reduce or compress large amounts of information into compact items, such as executive summaries, abstracts, terse conclusions, chemical structure diagrams, mathematical formulae, graphs, or charts.
	LINKAGE	The value added by providing pointers and links to items, sources, and systems external to the system in use, thus expanding the client's information options.
	PRECISION	The capacity of a system to aid users in finding exactly what they want, by providing signals on such attributes as language, data aggregation, sophistication level, or ranking output.
	SELECTIVITY	The value added when choices are made at the input point of the system, choices based on the appropriateness and merit of information chunks to the client population served.

* Synthesized based on Taylor, 1986, p. 48-70

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Appendix B5: Taylor's Value-added Criteria*

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Value-added Criteria	Measure	Definition
QUALITY: A "user criterion which has to do with excellence or in some cases truthfulness in labeling, and includes both (a) the reliability of the data/information or service, and (b) the assumptions made in original selection or generation of data" (p.62).	ACCURACY	The value added by system processes that assure error-free transfer of data and information as it flows through the system and is eventually displayed to a client.
	COMPREHEN-SIVENESS	The value added by the completeness of coverage of a particular subject or a particular form of information.
	CURRENCY	The value added by (a) the recency of the data acquired by the system; and (n) by the capability of the system to reflect current modes of thinking in its structure, organization, and access vocabularies.
	RELIABILITY	The value added by the trust a system inspires in its clients by its consistency of quality performance over time.
	VALIDITY	The value added when the system provides signals about the degree to which data or information presented to users can be judged as sound.
ADAPTABILITY: Values that respond to "the concern with how something is needed, and why, and how well the system, including the human actors, can respond to the environment in which the user operates" (p. 66). Related to users' problem situations besides subject matter. This criterion captures these attributes that measure the match between type of response and problem context.	CLOSENESS TO THE PROBLEM	The value added by the activities of the system, usually through human intervention, to meet the specific needs of a person in a particular environment with a particular problem; this implies knowledge of that person's style, bias, idiosyncrasies, and sophistication, as well as the politics and constraints of the context.
	FLEXIBILITY	The capability of a system to provide a variety of ways and approaches of working dynamically with the data/information in a file.
	SIMPLICITY	The value achieved by presenting the most clear and lucid (explanation, data, hypothesis, or method) among several within quality and validity limits; not to be confused with simplistic.
	STIMULATORY	Those activities of an information system that may not be directly supportive of its primary mission, but which assume importance in establishing a presence in the community or organization served and which encourage use of the system and/or its staff expertise.
TIME SAVINGS: The "response time of that system" including "How fast can a reference be retrieved, how fast can a document be delivered? How long need a customer wait at the terminal for a response, How long does it take to generate a special report" (p. 69).	RESPONSE-SPEED	The perceived value of a system on the speed of its response time.
COST SAVINGS: The "value achieved by conscious system design and operating decisions that save [real dollars] for the client" (p. 70).	COST-SAVINGS	The value achieved by conscious system design and operating decisions that save dollars for the client.

* Synthesized based on Taylor, 1986, p. 48-70

Appendix C

Appendix C includes summaries of data generated in the process of data analy[illegible].

Appendix C1: Summaries of Multiple Levels of Participants' Goals

Appendix C2: Causal and Temporal Relationship of Reasons for Selecting the AskERIC Q&A Service

Appendix C1: Summaries of Multiple Levels of Participants' Goals

ID	Goals of Using AskERIC Q&A	IPS Goals	Higher-Level User Goals
P1	Find independent research (not put by the company) on Lexile (a readability formula developed by a company).	Learn more about Lexile.	Get Lexile if it is better than the standard readability formula being used.
P2	Get research information about other communities and schools that have used SLANT strategy (a meta-cognition instructional strategy aimed to help at-risk students' learning).	Use SLANT strategy to conduct a classroom-based research project.	Attain a graduate degree.
P3	Figure out the most efficient way of locating accurate and complete lists of names of colleges & universities that offer degrees in education in the United States and other English-speaking countries.	Find potential subscribers of a review journal of children's science books of which the participant has been the editor so that she can send promotional materials to them.	Market the journal in order to reach a wider audience to improve the journal and to get better people to be involved.
P4	Find out a reasonable time frame between submission of written request and physical assessment of IEP. [D]	Fill in gaps the respondent had concerning the process.	Help a mother of a severe ADHD child in a support group to which the participant belongs.
P5	Find possible places that would give grants having to do with girls using computers in high schools.	Write and submit the grant proposal.	Get the grant funded.
P6	Find research-based information on best practices of intervention programs (anything schools are doing with their extended time) for students not performing on grade level.	Prepare himself to be able to respond to the committee.	Evaluate current practice at the school system. Plan an action supported by the research and apply it.
P7	Find a reference about learning disability that is connected with dissociated identity disorder. Test the AskERIC Q&A Service	Be able to explain what dissociated identity disorder is and how it is related to a learning disability that she had (because she had learning difficulty in classrooms before and was recently diagnosed as having dissociated identity disorder).	Get assessed for a learning disability in order to obtain some of the math requirements waived or put aside.
P8	Obtain a short list of Bloom's taxonomy of cognitive domain with brief definitions of terms.	Find a research-based platform to seek agreement of meaning of vocabulary with engineers to whom the participant serves as a technical editor.	Improve the vocabulary skills of engineers. Hold a workshop on terminology and try to standardize the way engineers use terms.
P9	Find ED number of a known ERIC digest.	Use the ED number in the reference list of a research paper (because she is using ED number as a part of the format).	Complete a research paper for a graduate class that she was taking.
P10	Get research-based information that shows late school starting time is detrimental to high school students.	Prepare a package and present it to the school board in order to support contention that high schools should not start late.	Influence the policy in the county by presenting research-based evidence to the school board at the public hearing.
P11	Obtain reliability and validity statistics on the career interest inventory and the depression index.	Write a research paper about unemployed men's depression levels and whether the career interest inventory would change that.	Fulfill a class assignment.
P12*	Get the statistical formula for the C-test. Test the AskERIC Q&A Service.	Perform a statistical analysis to conduct a time series.	Write a qualitative research proposal for a doctoral course.
P13	Get journal articles and documents on shared reading.	Conduct a study and write a paper for a college class that the participant was taking.	Complete the Masters' program in reading.
P14	Find out sources on faculty development processes for integrating technologies in curriculum in higher education and which agencies or areas are using this type of thing.Test the AskERIC Q&A Service.	Prepare for job interviews of dean's positions across the country.	Get recruited as a dean (carrier advancement).

ID	Goals of Using AskERIC Q&A	IPS Goals	Higher-Level User Goals
P15	Get information from medical experts on how to clean baby's ears and why using q-tips is wrong.Test the AskERIC Q&A Service.	Verify his common-sense of using q-tips to clean baby's ears.Verify the information obtained from a TV program that using q-tips to clean baby's ear is not appropriate.	Make sure not to damage his daughter's well being.
P16*	Get free or inexpensive electronic posters and/or other audio-visual materials.Test the AskERIC Q&A Service.	Prepare for a new computer literacy class at a local college.	Teach the class.
P17	Get research-based information on whether locating the talented and gifted magnet programs in low performing schools was good for the gifted and/ or the regular schools' kids.Test the AskERIC Q&A Service.	Obtain more sureness, based on research, to support her observation as a magnet parent that magnet programs need to be in a free-standing schools. Share information with other magnet parents.	Write a letter to school board to influence a political decision.Make the magnet programs better for her children.
P18	Learn how to use AskERIC Q&A Service by using a question selected from among those prepared by the instructor.	Learn how to conduct web-based research.Complete the assignment as soon as possible (because it was for Friday evening's class).	Get a good grade for the class.
P19	Get research-based information on whether starting the high school earlier would have any adverse effect upon the students' performance.	Present supportive evidence based on research of the joint administrative decision to change start time of elementary and high schools.	Convince the school board students' council, and teachers union of the decision. Prove own professional capability as a second-year principal.
P20	Find survey and research-based information on successful cooperative education programs of two-year colleges.	Enhance own background and objective standpoint about best practices.Share information with Co-op committee (faculty, career service director) by written report.	Help establish a work based learning program. Help the committee members to be able to make more informed decisions as to establishing practices.
P21	Get existing lesson plans and/or ideas of lessons on interpreting data and logical reasoning skills. Learn how to use the Internet to find the information.	Implement existing lesson plan and/or ideas to teach a class.Keep students busy with hands on activities so that they would not fall asleep. Meet particular requirements assigned by the principle.	Teach effectively in the classroom as a first-year teacher.Get permanently certified as a teacher.
P22	Get opinions from domain experts on problems she had in teaching: how to deal with children who are labeled as "low-functioning" but have average IQ; how to move transition special-ED students into full-time regular education; symptoms of fetal alcoholic syndrome.Test the AskERIC Q&A Service.	Solve the problems she had in teaching special ED classes with kids with different disabilities.	
P23	Verify own self-searching result on adopting a humanities curriculum for mainstreamed learning disabled students.Narrow-down the topic.	Develop guidelines for humanities curriculum for mainstreamed learning disabled students. Write a publishable article.	Fulfill the requirements for a fellowship that she received from the project proposal.
P24	Get a list of host-families in Europe who would host young children (11-year-old).	Decide where to send her son in Europe during the summer.Plan financial aspects.	Get her son experience living in other people's culture.
P25	Find out how much it would cost to obtaining journal articles, dissertations and ERIC documents that she found through self-searching of ERIC database.	Complete literature review.	Write dissertation.
P26	Find out what content is needed in school library handbook serving grades 9-12 (particularly where to place Internet and other electronic sources).	Revise the school library handbook to include Internet and other electronic sources.	
P27	Get journal articles from ERIC database on what the state of Ohio does; in comparison to what other states have done, in changing inequities of school funding.	Fulfill assignments for three classes that he is taking.	Make changes of life/job by getting a Bachelor's degree.

ID	Goals of Using AskERIC Q&A	IPS Goals	Higher-Level User Goals
P28	Get statistics and information on available special ED services in various states concerning inclusion. Test the AskERIC Q&A Service.	Decide where to relocate.	Make a good choice for her down syndrome daughter's benefit. Not to put her daughter into a self-contained classroom.
P29	Get an ERIC digest, the reading assignment of a class of which she knows title and author.	Read the digest, which is a background reading assignment.	Meet a course requirement.
P30	Find research literature on the changing role of speech language pathologists.	Write a part of report for the grant. Train kindergarten teachers and speech pathologists through a workshop.	Help teachers to become more language based in the classroom. Help speech pathologists to work as effective consultants. Submit the paper for publication.
P31	Locate download pictures relevant to Black History Month. Test the AskERIC Q&A Service.	Help students develop multimedia presentation for social studies classes. Develop a guide of recommended web sites for K-12 educators.	Fulfill job requirements to teach teachers and students computer skills and help them use computers integrating into the curriculum.
P32	Get lesson plans on tolerance suitable for 4th and 5th grades.	Prepare for teaching special ED classes, which she taught before.	Teach 4 lessons next week.
P33	Learn how to use AskERIC Q&A Service.	Follow the instructor (come up with some question and send it to AskERIC Q&A Service).	
P34	Get supportive opinions from experts in education to reinforce his position that 25 multiple-choice questions used by the school to screen students for advanced science curriculum were unfair.	Convince the school that the screening process was unfair.	Protect taxpayers' right to have a fair testing practice in education.
P35	Get additional resources to find information on financing learning organization.	Get the research done and turn all papers in.	Get doctorate.
P36	Obtain fulltext of ERIC documents found in self-searching of ERIC database.	Complete a literature review within the next two weeks.	Make progress in the doctoral program.
P38	Find out the procedure of obtaining permission to include an ERIC document in a course pack.	Get permission to include ERIC documents in a course pack.	Put the course pack together by the deadline.
P40	Get research-based data of a reasonable time frame for ESL students to acquire adequate language skills to be validly tested by standardized tests.	Come up with strategies to: (1) improve the school's standardized test scores; (2) help improve language ability of ESL students become more testable by standardized tests.	Influence state legislature to change the current practices (summary school scores are based on average test scores of all students of the school, assuming ESL students scored zero if they don't take the test).
P41	Decide whether to select math anxiety as the topic of research paper for a graduate class.	Write a research paper for a graduate class.	
P42	Find out how to obtain fulltext ERIC documents in a more cost-effective and less time-consuming way than what she had been doing.Examine whether the ERIC accession numbers (EDs and EJs) are universal.Test whether AskERIC is accessible from home.	Update information on non-medical intervention in fetal alcohol syndrome and attention deficit disorder to write a paper for a graduate degree. Save time to go to campus or library and save tuition required for being a full-time student.	Help her son who has attention deficit disorder.Help herself teach special ED classes.
P43	Verify the results of own self-searching of ERIC database on academic advising and its' relationship to retention. Test the AskERIC Q&A Service.	Make sure she is on the right track of her doctoral dissertation.	Complete the literature review for her dissertation.
P44	Find information appealing to parents on benefits of receiving foreign language education in elementary schools. Test the AskERIC Q&A Service.	Prepare for a presentation she is going to have in front of parents.	Fulfill job responsibility effectively.
P45	Find Internet sites where she can get readings in the science content area.	Find articles to critique in class discussion.	Fulfill the assignment to pass the class.

ID	Goals of Using AskERIC Q&A	IPS Goals	Higher-Level User Goals
P46	Get existing lesson plans for using the book" Stuart Little" written by E.B. White.	Develop a lesson plan to teach English as a second language class for 3-4 grade.	Help evaluate students understanding and comprehension in the class.
P47	Find research information on play problems and social interaction skills of special needs children with non-disabled peers. Test the AskERIC Q&A Service	Conduct a research of developing/testing an intervention strategy for children with play problems as Master's thesis.	Get Master's degree.
P48	Find out whether the price of old ERIC documents listed in the ERIC database is current, and whether it is appropriate to write the publisher directly to order these documents. Verify own search process by asking possible sources of information on the topic of outcomes assessment in higher education and its influence on quality.	Get ready to start writing the literature review of the dissertation by obtaining all relevant information sources.	Write a comprehensive literature review of the dissertation.Get prepared for the dissertation defense.
P49	Get additional journal articles on teaching equitably in elementary classroom. Verify own search results Learn how to use ERIC database.	Get ready to write a literature review for a paper.	Write a good research paper for a distant graduate class.
P50	Find out whether there is enough relevant information on the topic of parental involvement in bilingualism so that she can write a paper on it.	Submit a proposal of a paper to the professor (to get permission for the topic of the paper).	Write the paper ahead of time so that she can spend enough time for other project.
P51	Get empirical literature concerning the behavior modification programs (token economy system) of special ED students and the effectiveness of such programs.	Fulfill the class assignment of writing journal abstracts for research based articles every week.	Get Master's degree.
P52	Find out the procedure set by the law to determine whether a child is eligible for special ED.	Get prepared to question the new psychologist who believes in mainstreaming at MDC and IEP meeting.	Get more special need children in pull out setting to work with them in one-on-one setting without the distraction of the other students.
P53	Find out whether there are enough articles and books to write a paper on the topic of relationship between neuroplasms and behavior, particularly during a counseling interview.Test the AskERIC Q&A Service.	Decide topic of an assignment for educational research course. Fulfill personal curiosity.	
P54	Obtain up-to-date statistical data on non-English speaking students of every school district in United States in .dbf or .xis format.Test the AskERIC Q&A Service.	Incorporate the data into spreadsheet to find best opportunities to sell the product (standard documents used by schools to communicate with parents in 17 languages on a CD).	Find the opportunities for his company to fulfill his responsibility as the director of sales and marketingadministration.
P55	Get metadata of sources relevant to Michigan schools-work-programs from ERIC database.	Write a paper for a graduate class.	Become a vocational education teacher.
P56	Identify best Internet sites to promote the music textbook he wrote. Test the AskERIC Q&A Service.	Supplement publisher's effort to sell his own book better.	Promote the book in an effective way.
P57	Get the Individuals Disabilities Education Act and its interpretations regarding the pre-assessment procedure of regular education students.	Share the information at a school meeting with the principle and student study team to discuss what the law states about the pre-assessment, what must be done to accommodate, regular education students before they go to assessment by special education staff.	
P58	Find out how to find lesson plans on including students with disabilities in the regular classroom.Test the AskERIC Q&A Service.	Develop a lesson plan for a special ED class that she is taking.	Fulfill course requirement.
P59	Get review of literature relevant to how attendance in K-5 affects academic achievement. Test the AskERIC Q&A Service.	Verify own research findings.Write the first chapter of a paper on the topic, which is due next week.	Complete the thesis to get the degree of educational specialist and administration.
P60	Find aggregated data of high-school dropout rates of gifted- leaning-disabled students. Verify own search process.	Develop the best strategy to get the school-district take action.	Influence the school district to start a program for gifted-learning-disabled students.

ID	Goals of Using AskERIC Q&A	IPS Goals	Higher-Level User Goals
P62	Find literature regarding forecasting for future trends in education.	Write the final paper for a class.	
P63	Get lesson plans on food pyramid and different health groups geared for first grade classes.	Use the lesson plan in own classroom. Learn from other teachers how to teach the topic.	
P64	Find out the legal responsibility of a high school from which her ADD brother dropped-out.	Negotiate with special ED specialist of the school district. Write a term paper for special ED class.	Get the school district provide proper education to her brother.
P65	Get journal articles relevant to co-curricular activities in the concept of ranging the problem of excellence.	Write a literature review of action research project paper for his Masters. Fulfill own interest in teaching at a school.	Get a good grade on the project since the major portion of it is literature review.

Appendix C2: Causal and Temporal Relationship of Reasons for Selecting the AskERIC Q&A Service (N=62)

Relationship	Description	Total
rA1=>select-AskERIC	Planned-use (A1) caused the participant to select AskERIC	3
rA2=>B3	Self-searching failure (A2) caused need for help in IPS (B3).	5
rA2=>D1	Self-searching failure (A2) caused frustration of self-searching (D1).	7
rA2=>select-AskERIC	Self-searching failure (A2) caused the participant to select AskERIC.	16
rA3‡C4	When the participant encountered AskERIC (A3), s/he remembered AskERIC (C4).	2
rA3‡C5	When the participant encountered AskERIC (A3), s/he remembered ERIC (C5).	3
rA3‡D2	When the participant encountered AskERIC (A3), s/he had opportunistic hope (D2).	10
rA3=>select-AskERIC	Encountering (A3) caused the participant to select AskERIC.	19
rA4=>select-AskERIC	Habitual use of the service (A4) caused the participant to select AskERIC.	7
rA5=>select-AskERIC	The participant selected AskERIC because s/he wanted to try the new information source (A5).	3
rA6=>select-AskERIC	The participant selected AskERIC because s/he had exhausted relevant sources (A6).	2
rA7‡A2	When the participant was searching the ERIC database (A7), s/he failed to find information (A2).	7
rA7‡A3	When the participant was searching the ERIC database (A7), s/he encountered AskERIC.	8
rA8‡A2	When the participant was searching the Internet (A8), s/he failed to find information (A2).	6
rA8‡A3	When the participant was searching the Internet (A8), s/he encountered AskERIC (A3).	8
rB1=>select-AskERIC	Because the participant needed information (B1), s/he selected AskERIC.	9
rB2=>select-AskERIC	Because the participant wanted to verify her/his own search result (B2), s/he selected AskERIC.	2
rB3=>select-AskERIC	Because the participant needed help in her/his IPS, s/he selected AskERIC.	9
rB4=>select-AskERIC	Because the participant wanted to test the AskERIC Q&A service (B4), s/he selected it.	5
rC1=>select-AskERIC	Because the participant knew AskERIC Q&A Service (C1), s/he selected it.	2
rC2=>C5	Because the participant knew the ERIC database/system (C2), s/he remembered it (C5).	3
rC3=>A2	Because the participant's IPS skill was limited (C3), s/he failed to find information in self-searching (A2).	2
rC3=>B3	Because the participant's IPS skill was limited (C3), s/he needed help for the IPS (B3).	5
rC3=>C7	Because the participant's IPS skill was limited (C3), s/he had a positive image of the AskERIC Q&A Service (Hx3351).	4
rC3=>D2	Because the participant's IPS skill was limited (C3), s/he had opportunistic hope (D2).	2
rC3=>select-AskERIC	Because the participant's IPS skill was limited (C3), s/he selected AskERIC	6
rC4=>select-AskERIC	Because the participant remembered AskERIC (C4), s/he selected it.	3
rC5=>select-AskERIC	Because the participant remembered ERIC database/system (C6), s/he selected AskERIC.	4
rC6=>select-AskERIC	Because the topic of the search and the domain of the service matched (C6), the participant selected AskERIC.	11
rC7=>A4	A positive image of AskERIC (C7) caused the participant to become a habitual user of the service (A4).	4
rC7=>select-AskERIC	A positive image of AskERIC (C7) caused the participant to select it.	32
rC8=>C7	A positive image of ERIC (C8) caused the participant to have a positive image of AskERIC (C7).	5
rC8=>select-AskERIC	A positive image of ERIC (C7) caused the participant to select AskERIC.	5
rC9=>A8	A negative image of libraries (C9) caused the participant to search the Internet (A8)	2
rC9=>select-AskERIC	A negative image of libraries (C9) caused the participant to select AskERIC.	2
rC10=>C7	A negative image of Internet search (C10) caused the participant to have a positive image of AskERIC (C7).	5
rC11=>select-AskERIC	Because the participant thought the AskERIC was a logical choice (C11), s/he selected it.	3
rC12=>select-AskERIC	Participant selected AskERIC because of his/her intuition (C12).	2
rD1=>select-AskERIC	Frustration of self-searching (D1) caused the participant to select AskERIC.	7
rD2=>select-AskERIC	Opportunistic hope (D2) caused the participant to select AskERIC.	11

Relationship	Description	Total
rD3=>select-AskERIC	Participant selected AskERIC because s/he had nothing to lose (D3) by using it.	3
rE1=>select-AskERIC	Because s/he was compelled to use it (E1), s/he selected it.	3
rE2=>A7	Because participant was compelled to use ERIC (E2), s/he did ERIC database search (A7).	2
rE3=>A4	Good experience of AskERIC (E3) caused the participant to be a habitual user (A4) of the service.	4
rE3=>C7	Good experience of AskERIC (E3) caused the participant to have a positive image of AskERIC (C7).	11
rE3=>select-AskERIC	Good experience of AskERIC (E3) caused the participant to select AskERIC.	10
rE4=>A7	Good experience of ERIC (E4) caused the participant to perform ERIC database search (A7).	3
rE4=>C7	Good experience of ERIC (E4) caused the participant to have a positive image of AskERIC (C7).	2
rE4=>C8	Good experience of ERIC (E4) caused the participant to have a positive image of ERIC (C8).	5
rE5=>select-AskERIC	A negative image of libraries (E5) caused the participant to select AskERIC.	2
rE6=>select-AskERIC	Human influence to use AskERIC for the IPS (E6) caused the participant to select it.	9
rE7=>A7	Human influence to use ERIC for the IPS (E7) caused the participant to perform ERIC database search (A7).	4
rE8=>select-AskERIC	Reputation of AskERIC (E8) caused the participant to select it.	4
rE9=>select-AskERIC	Media influence of AskERIC (E9) caused the participant to select it.	5
rE10=>select-AskERIC	Time limitation (E10) caused the participant to select AskERIC.	7
rF1=>A8	Convenience (F1) caused the participant to perform Internet search (A8).	3
rF1=>select-AskERIC	Convenience (F1) caused the participant to select AskERIC.	7
rF2=>select-AskERIC	Participant selected AskERIC because it was bookmarked (F2).	3
rF3=>select-AskERIC	Participant selected AskERIC because it was available (F3).	6

"A => B" represents causal relationship from A to B.
"A ‡ B" represents temporal sequence in which A occurred before B

APPENDIX D

Appendix D includes examples of data instances.

Appendix D1: Difficulty in Articulating Information Needs

Appendix D2: Testing the AskERIC Q&A Service

Appendix D3: Length of Request Messages with Task Codes

Appendix D4: Contradiction between Type of Information Sought and Requested

Appendix D5: User Biases in Information Needs

Appendix D6: Social Influence in Generating Information Needs

Appendix D7: Personal Interest in Generating Information Needs

Appendix D8: Negative Feeling Accompanied with Self-Searching

Appendix D9: No Emotional Involvement in Self-Searching

Appendix D10: Association between Confidence and Experience in Using the AskERIC Q&A Service

Appendix D11: Planned use of the AskERIC Q&A Service

Appendix D12: No Experience with AskERIC Q&A Service (an Opportunistic Hope)

Appendix D13: Switching the IPS Goal When Encountered the AskERIC Q&A Service

Appendix D1: Difficulty in Articulating Information Needs

I think... my question wasn't very clear, because I didn't know exactly what I was talking about. And so I received the information that barely didn't pertain what I had in my mind... (P50)

In looking back over that... I just may be I wasn't ask as specific as I said to them to get what I wanted (P51)

Appendix D2: Testing the AskERIC Q&A Service

... a professor wanted to be introduced us to AskERIC and he wanted us to come up with a question... In reality it was just a question that I came up with. I wasn't really requesting anything in particular. Anything would have been fine, it was just to see how the service worked (P33).

... I'm going my initial research just looking out, haven't really gotten going yet. And I just stumbled upon this AskERIC and just decoded to try it. It is nothing I intended to look for or anything. O just decided to try it to see if I could get any sources (P59).

Appendix D3: Length of Messages with Task Codes

Shortest request messages (8 words)

Could you please send me Bloom's complete taxonomy? (P8)
⇨Request was classified as fact-finding task (D1_fac) that was confirmed by the interview data.

How can parents help their child's bilingual development? (P50)
⇨Request was classified as opinion-generating task (D3_opi), but the interview revealed that the user requested source-locating task (C1_loc).

Median length request messages (27 words)

How can I get the information that is in the material you describe? For instance you describe the material that is ED381528, where is the paper? (P55)
⇨Request was classified as source-obtaining task (C2_acc) that was confirmed by the interview data.

I am writing a music textbook for a major music publishing company. In addition to their promotion of the book, how can I effectively promote the book (P56)?
⇨Request was classified as opinion-generating task (D3_opi), but the interview revealed that the user intended to request other task (F_oth).

Longest request messages (310 words)

I have a son in the eighth grade who has been denied the Advanced Science curriculum. His placement was based on three criteria that the school had sent out to the parents in the Student Handbook: high grade average at the end of five grading periods, high achievement test scores

in science, and teachers recommendation. The Principal added a fourth criteria the next to the last day of school which was a 25 question multiple choice test that would carry 25% of the final grade average. My son had a 100% grade average, post high school scores on his Achievement Test in the science part of the test. He scored a 60% on his multiple-choice test, which put him out of the Advanced Science. He also had teacher recommendations. I claim that this test was unfair because I cannot see how a 25 multiple choice test could carry 25% of his full years work in a curriculum. I have been asking the school since last August to prove to me, that this was a fair test. I asked for all of the scores and grades of the whole 7th grade and the school withheld 93 student scores and when I brought this to their attention they said these were lesser scores and would be irrelevant to anything. When I averaged all of the grades of the students, I found that they had removed approximately 13 students that should have been in the advanced curriculum and put 13 students in it who would never have qualified because of lower scores. When I confronted them with this information they insisted that it was a fair test, but have not backed it up with any proof or evidence. What should I do? I am at wits end and am truly interested in bringing this to some kind of a fair determination. (P34)

⇨Request was classified as opinion-generating task (D3_opi) that was confirmed by the interview data.

Appendix D4: Contradiction between Type of Information Sought and Requested

... I had requested articles... on intervention programs for students not performing on grade level. And, just wanted anything that schools are doing with their extended time like summer school or Saturday school or after-school programs... [AskERIC response] directed me to sources [but]... what I wanted was a quick answer ... saying what are some of the best practices... (P6)

I was looking for a particular ERIC digest and I could not locate in the Internet, I knew it had to be there because I had a copy and I could not find it. So they were kind enough to help me... [AskERIC response] was what I requested [but] it still did not have the ED number on it... I was specifically looking for the ED number to use as a reference... (P9)

Appendix D5: User Biases in Information Needs

... I work with engineers. And they throw words around like "analysis" and "evaluation" and "synthesis" and... And my suspicion, at least according to Bloom's taxonomy, they throw them around incorrectly. And... as their editor, I decided: Well, let me bring in some ammo and see if we could agree on, ya know, when to use "analysis" and when to use "synthesis" et cetera. So, my first... ya know, I have a... I have a degree in English but I have a degree in... I'm a certified teacher, or was at one time. And... So I knew about Bloom's taxonomy. So... That's why I wanted the, the, the list.

I requested the information regarding the benefits of foreign language instruction in the elementary school...Yes what are the student benefits of studying a foreign language in elementary school... I was looking for things that parents would be interested in... I wanted some concrete things that parents would appreciate as benefits to their children (P44 – presentation).

Appendix D6: Social Influence in Generating Information Needs

[I use the information to] support our contention that high schools don't need to start so late, when we go to the school board. Because they are wanting, I am a high school teacher, at 9:30 in the morning which will put our students getting out at 4:15 pm, us getting out a quarter to five and it would just absolutely kill all of our extra curricular stuff and it would keep our students from being able from having jobs after school. And there is several programs that require kids to do after school things like externships, where they go work for lawyers and stuff and they would not have time to do that. So it is very important... All I knew about it was that I don't want to do it... it is bad for my students. I knew no actually studies or anything like that. Not a thing... I couldn't find anything that supported my position. I found one article that supported the other people's position. (P10 – opinion-generating).

Appendix D7: Personal Interest in Generating Information Needs

I wanted to find anything about learning disability that connected with dissociated identity disorder... I've just found out that I have dissociative disorder. And, probably, identity disorder and I've had long-term, very specific problems with learning. And have just been sort of realizing that this wasn't just me... I got an assessment for somebody who knows about learning disabilities, that I could kind of explain how, how this worked with me... it's a very personal reason but you find that if you try to tell people that you don't know that you have difficulty doing this or that, they look at you like: Huh? Why... ya know, why are you special? But if you can kind of point to, ya know... get it more in language that they're used to dealing with, and a little less personal, then... you can communicate better... I was hoping to get some of the math requirements waived or put aside. And so I was trying to work with these, this student services for disabled... if you have a learning disability what is it?... and so I was trying to define things for them and actually I just... I found a way around it. It was kind of part of a little bit of panic shall we say (P7).

It was a question as far as a health care... with a baby 20 months old. I've been reading... We've been regularly cleaning her ear with q-tips and I was reading and seeing talk shows with all these "never put q-tips in the ear" and just... may be just wanted to know what q-tips for and if you don't get wax what else other than q-tips can se use. So I just wanted to see if may be some one had a information that can be provided about that (P15).

Appendix D8: Negative Feeling Accompanied with Self-Searching

Like I was stabbing in the dark. Frustrated, again I'm a novice at this and this the first time I was trying to do some scientific research (P30).

The fact that I'm not used to use the computer, and all this is new to me, so makes me kind of nervous and tense... from the beginning (P49).

Appendix D9: No Emotional Involvement in Self-Searching

[I felt] neither helpless...I just...I realized I need more time and I didn't have the time, and the service was there, and so I utilized the service. (P14)

You know I read that question [Q17 on feeling] and the only way I can describe how I felt is that I felt normal. I do a lot of research, I just feel normal. (P17)

Appendix D10: Association between Confidence and Experience in Using the AskERIC Q&A Service

> Well the second time, after knowing that it would work, I just felt that it was a very appropriate way. I felt that any time I can't find what I'm looking for myself, if I just were to ask and give the author and title or whatever I knew, that somebody would probably get back to me... I felt very confident. I feel more confident that if I'm confused in the future, I will just ask and say that I am looking for "this" and know that somebody would help me and I would be very comfortable... (P29)

Appendix D11: Planned use of the AskERIC Q&A Service

> ... after about two hours of doing [self-searching] and just checking around I just decided to go to AskERIC which is where I should have gone to start with... I have had such good luck in the last couple of years with AskERIC, that that is the first place I go when I can't find something, or when I found something and I want more... .I felt like if there was anything to be found, it would be from AskERIC. (P46)

Appendix D12: No Experience with AskERIC Q&A Service (an Opportunistic Hope)

> ...[I was] a little bit frustrated because I couldn't find anything that would help me.... And that's when I found [AskERIC web site]... the description of what AskERIC seemed logical. He is a resource for education and people who want to learn about education and teaching and learning so I thought, he, this could be the source. And so that's how I read the description and thought, well maybe this is it. I could start here... I wasn't really confident... I was hoping that [AskERIC] would be the resource to help me find the information... (P24)

Appendix D13: Switching the IPS Goal When Encountered the AskERIC Q&A Service

> I accidentally found AskERIC. I don't know how I got there, but I just accidentally found it. My girlfriend and I were on the Internet... she was looking for some other information and then somehow we just came across this... we got to sitting here and we were playing around trying to find some other information that she was wanting to look up... We started looking at "Research" and "Learning"... and somehow we came across AskERIC. Honestly, I don't know how I found ERIC... I just saw it, it looked so neat that I could put in some questions and get some help... I was so excited, I was jumping up and down... and I was like "this is cool, let's just do this"... I was real excited... I was so excited that I could put in a question and some key words and that they would come up with websites for me to go to that I didn't have the addresses for. (P47)

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